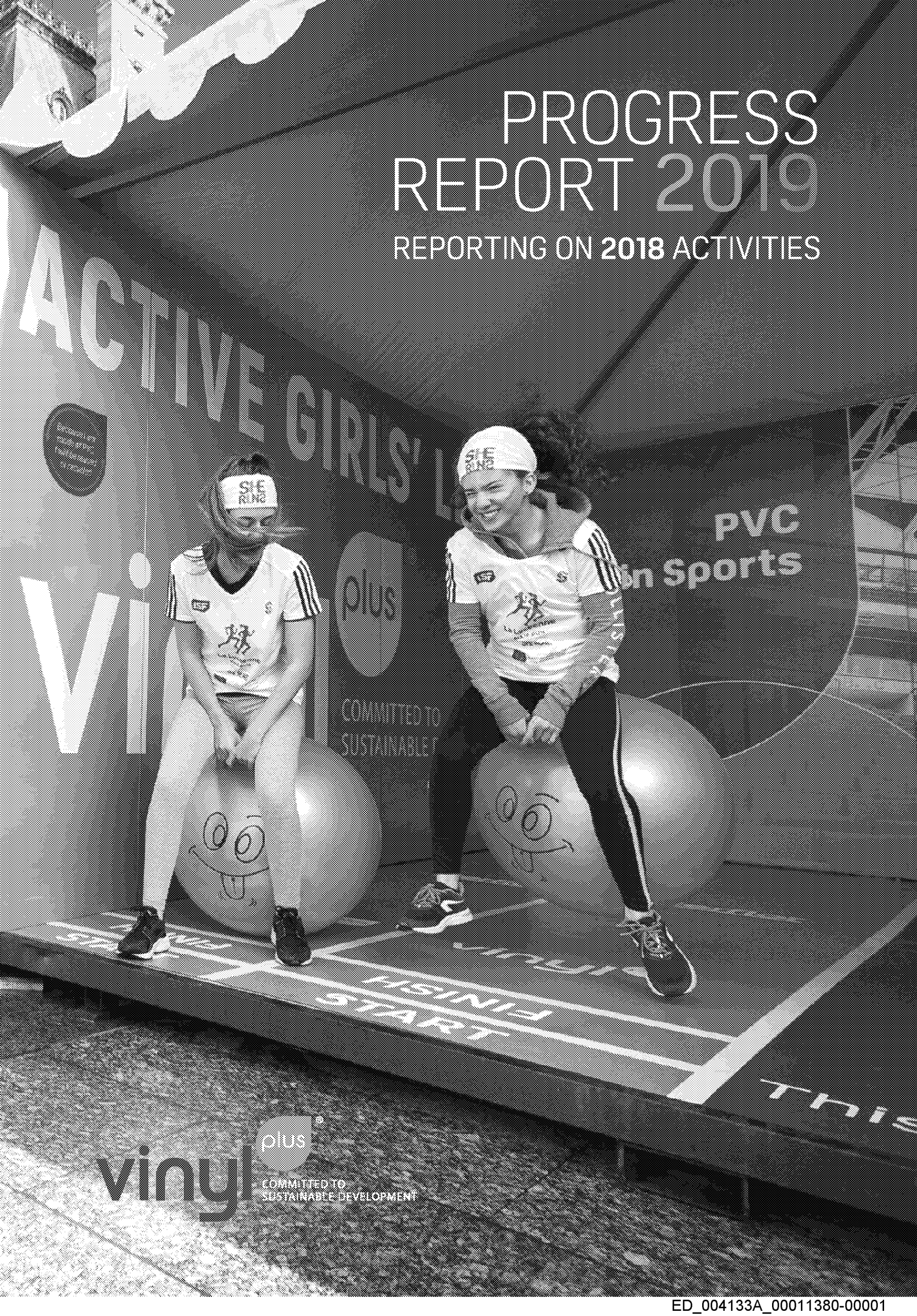


PROGRESS REPORT 2019

REPORTING ON 2018 ACTIVITIES





VINYLPLUS PARTNERS

IN 2018, THE CONTRIBUTORS WERE:

CONVERTERS:

A. Kolckmann GmbH (Germany)
 Allatherm SpA (Italy)
 Allaxis Group (Belgium)
 Alkor Draka SAS (France)
 Altro (UK)
 Altro Debolon Dessauer Bodenbeläge GmbH & Co. KG (Germany)
 alfer* aluminium GmbH (Germany)
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 alwitra GmbH & Co (Germany)
 AMS Kunststofftechnik GmbH & Co. KG (Germany)
 Amtico International (UK)
 Avery Dennison Materials Europe BV (Netherlands)
 Beaulieu International Group (Belgium)
 Berry Plastics (Germany)
 Bicare Research (Germany)
 BM S.L. (Spain)
 BT Bautechnik Impex GmbH & Co. KG (Germany)
 BTH Fitting Kft. (Hungary)
 CF Kunststoffprofilen (Netherlands)
 Chieftain Fabrics (Ireland)
 CIERA (France)
 Coveris Rigid Hungary Ltd (Hungary)
 Danosa (Spain)
 Deceuninck Ltd (UK)
 Deceuninck NV (Belgium)
 Deceuninck SAS (France)
 Dekura GmbH (Germany)
 DHM (UK)
 Dickson Saint Clair (France)
 Draka Polymer Films BV (Netherlands)
 Dyka BV (Netherlands)
 Dyka Plastics NV (Belgium)
 Dyka Polska Sp. z o.o. (Poland)
 Dyka SAS, former SOTRA-SEPEREF SAS (France)
 Elbtel Plastics GmbH & Co. KG (Germany)
 Epwin Window Systems (UK)
 Ergis SA (Poland)
 FDT FlachdachTechnologie GmbH & Co. KG (Germany)
 Finstral AG (Italy)
 FIP (Italy)
 Gealan Fenster-Systeme GmbH (Germany)
 Georg Fischer Deka GmbH (Germany)
 Gerflor Mipolam GmbH (Germany)
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 Gerflor Tarare (France)
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 Girpi (France)
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 Gruppo Fabbri (Svizzera) S.A. (Switzerland)
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 Holland Colours NV (Netherlands)
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 IKA Innovative Kunststoffaufbereitung GmbH & Co. KG (Germany)
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 MKF-Ergle Sp. z o.o. (Poland)
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 Nicoll (France)
 Nicoll Italy (Italy)
 Nordisk Wavin AS (Denmark)
 Norsk Wavin AS (Norway)
 Novafloor (France)
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 Serge Ferrari SAS (France)
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 Sika Trocal GmbH (Germany)
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 Stoen Industries (Belgium)
 SKZ-Testing GmbH (Germany)
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 Soprema Srl (Italy)
 Stöckel GmbH (Germany)
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 Tonameier Kunststoffe GmbH & Co. KG (Germany)
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 Veka SAS (France)
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 Vulcalflex SpA (Italy)
 Wavin Baltic (Lithuania)
 Wavin Belgium BV (Belgium)
 Wavin BV (Netherlands)
 Wavin France SAS (France)
 Wavin GmbH (Germany)
 Wavin Hungary (Hungary)
 Wavin Ireland Ltd (Ireland)
 Wavin Metalplast (Poland)
 Wavin Nederland BV (Netherlands)
 Wavin Plastics Ltd (UK)

PVC RESIN PRODUCERS:

Ercros (Spain)
 INOVYN (Belgium, France, Germany, Italy, Norway, Spain, Sweden, UK)
 Shin-Etsu PVC (Netherlands, Portugal)
 VESTOLIT GmbH (Germany)
 Vinnolit GmbH & Co. KG (Germany, UK)
 Vynova Group (Belgium, France, Germany, Netherlands, UK)

PVC STABILISER PRODUCERS:

Akdeniz Kimya A.S.
 Asua Products SA
 Baerlocher GmbH
 Chemson Polymer-Additive AG
 Galata Chemicals
 IKA GmbH & Co. KG
 LANXESS Deutschland GmbH
 PMC Group
 Reagens SpA
 Vaitris Specialty Chemicals

PVC PLASTICISER PRODUCERS:

BASF SE
 DEZA a.s.
 Evonik Performance Materials GmbH
 ExxonMobil Chemical Europe Inc.
 Grupa Azoty ZAK SA
 LANXESS Deutschland GmbH
 Perstorp Oxo AB
 Proviron

ASSOCIATE MEMBERS:

AGPU – Arbeitsgemeinschaft PVC und Umwelt e.V. (Germany)
 British Plastics Federation (BPF) VinylPlus UK
 PVC Forum Italia (Italy)

* Companies that joined VinylPlus in 2018

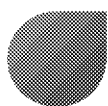


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Launched in 2011, VinylPlus® is the renewed 10-year Voluntary Commitment to sustainable development of the European PVC industry. The VinylPlus programme was developed through open dialogue with stakeholders, including industry, NGOs, regulators, civil society representatives and PVC users. The regional scope is the EU-28 plus Norway and Switzerland.

This report summarises VinylPlus' progress and achievements in 2018 in each of the five key sustainability challenges identified for PVC on the basis of The Natural Step System Conditions for a Sustainable Society (www.thenaturalstep.org/pvc).

The Progress Report 2019 has been independently verified by SGS, while tonnages of recycled PVC waste and expenditures have been audited and certified by KPMG.

A full glossary of abbreviations appears at the end.

For detailed descriptions of the projects and activities please visit www.vinylplus.eu.

GOVERNANCE

VINYLPLUS MANAGEMENT BOARD

VinylPlus is managed by a board representing all European PVC industry sectors.

Members

Ms Karin Arz – *EuPC¹ (Flexible PVC sector)^(a)*
Mr Fabrice Barthélemy – *EuPC (Flexible PVC sector)^(b)*
Mr Fausto Bejarano – *EuPC (Rigid PVC sector)^(c)*
Mr Dirk Breitsbach – *EuPC (Compounding sector)*
Mr Filipe Constant – *ECVM 2010²*
Mr Alexandre Dangis – *EuPC*
Dr Brigitte Dero – *General Manager (ECVM 2010)*
Mr Joachim Eckstein – *EuPC^(d)*
Mr Stefan Eingärtner – *Technical Director*
Dr Josef Ertl – *Chairman^(e) (ECVM 2010)*
Mr Rainer Grasmück – *ESPA³*
Mr Andreas Hartleif – *Vice Chairman^(f) (EuPC – Rigid PVC sector)*
Dr Zdenek Hruska – *ECVM 2010*
Dr Ettore Nanni – *Treasurer (ESPA)*
Mr Hans-Christoph Porth – *ECVM 2010*
Mr Maarten Roef – *EuPC (Rigid PVC sector)^(g)*
Mr Nigel Sarginson – *European Plasticisers⁴*
Dr Arjen Sevenster – *Controller (ECVM 2010)*
Dr Karl-Martin Schellerer – *ECVM 2010*
Mr Stefan Sommer – *Chairman^(h) (ECVM 2010)*
Mr Geoffroy Tillieux – *Controller (EuPC)*
Mr Joachim Tremmel – *European Plasticisers*
Ms Myriam Tryjefaczk – *EuPC (Flexible PVC sector)⁽ⁱ⁾*
Mr Christian Vergeylen – *Vice Chairman^(j) (EuPC – Flexible PVC sector)*

^(a) – From 12 May 2018 ^(b) – From 15 October 2018
^(c) – From 18 May 2018 ^(d) – From 11 December 2018
^(e) – From 16 December 2018 ^(f) – From 16 October 2018

MONITORING COMMITTEE

The VinylPlus Monitoring Committee is an independent body that provides guidance and advice, and that supervises the implementation of the Voluntary Commitment. To ensure maximum transparency, participation and accountability, the Monitoring Committee is open to all external stakeholders. It currently includes representatives of the European Commission, the European Parliament, academia, trade unions and consumer organisations, as well as representatives of the European PVC industry.

The Committee met formally twice in 2018, in April and in November.

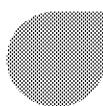
The minutes of each Monitoring Committee meeting are published on the VinylPlus website after formal approval at the following meeting.

Members

Ms Laure Baillargeon – *Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs (DG GROW), European Commission^(a)*
Mr Werner Bosmans – *Directorate-General Environment (DG ENV), European Commission*
Prof. Alfons Buekens⁵ – *Chairman of the Monitoring Committee^(b)*
Dr Alain Cavallero – *Secretary General of ESPA*
Mr Alexandre Dangis – *VinylPlus Board Member*
Mr Armand De Waele – *Euroconsumers Group⁶*
Dr Brigitte Dero – *General Manager of VinylPlus*
Prof. Dr Ir. Jo Dewulf⁷ – *Chairman of the Monitoring Committee^(c)*
Ms Martina Dlabajová – *Member of the European Parliament*
Mr Joachim Eckstein – *VinylPlus Board Member^(d)*
Mr Sylvain Lefebvre – *Deputy General Secretary, IndustriAll European Trade Union⁸*
Mr Eric Liégeois – *Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs (DG GROW), European Commission^(e)*
Mr Nuno Melo – *Member of the European Parliament*
Dr Ettore Nanni – *Treasurer of VinylPlus*
Mr Stefan Sommer – *Chairman of VinylPlus*

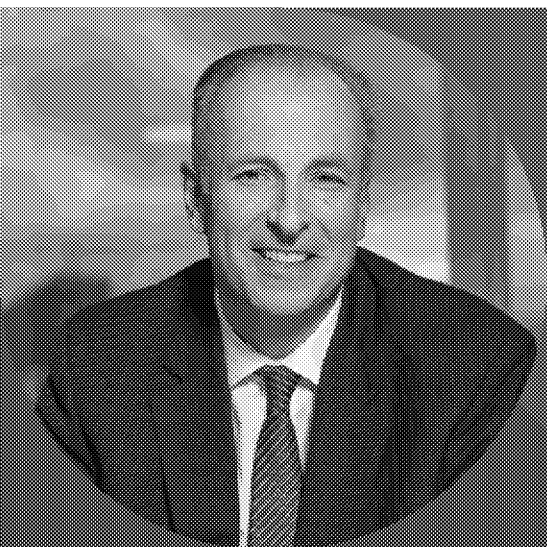
^(a) – From April 2018 ^(b) – From 11 October 2018 ^(c) – From April 2018
^(d) – From 1 December 2018 ^(e) – From May 2018

1. EuPC: European Plasticisers Convention (www.eupc-convention.europa.eu)
2. ECVM 2010: The European Association of PVC Manufacturers (The European Council of Vinyl Manufacturers – www.ecvm2010.org)
3. ESPA: The European Standardisation Industries Association (www.espa.be)
4. European Plasticisers for Polyethylene (EPP) and for Polypropylene (EPP) the European Chemical Industry Council (ECC) – www.ecc.europa.eu
5. Professor Buekens passed away on 19 February 2018. He was replaced by Prof. Dr Ir. Jo Dewulf.
6. Euroconsumers Group (www.euroconsumers.eu)
7. Department of Textile, Fibre and Technology, Ghent University, Belgium (www.ghent.ac.be)
8. IndustriAll European Trade Union (www.industriall.eu)



FOREWORD

2018 was another challenging year for our industry, and VinylPlus took an increasingly active role in promoting the sustainable development of our sector. We collaborated even more closely than before with the European institutions to implement the European Strategy for Plastics in a Circular Economy, and with other trade associations to propose proactive solutions to the new challenges faced by the plastics industry.



STEFAN SOMMER

Chairman of VinylPlus

In January 2018 we and five other European plastics associations jointly committed to launching circularity platforms with the aim of recycling 50% of all plastics waste by 2040. We followed up on this commitment throughout the year. In September, backing the European Commission's call for industry pledges to increase the recycling of plastics, we committed to recycling at least 900,000 tonnes of PVC per year into new products by 2025. This will represent a significant contribution to the objective of 10 million tonnes set by the Commission for the plastics industry as a whole.

In November, VinylPlus joined CEFIC as a Partner Association. This will allow us to work more closely with the European chemical industry to develop effective sustainability solutions to challenges that require more-complex and more-integrated approaches.

Collaboration with the plastics value chain and with the European Commission will continue in 2019. Indeed, VinylPlus accepted the Commission's invitation to be part of the Circular Plastics Alliance, the high-level multi-stakeholder platform aimed at improving the economics and quality of plastics recycling in Europe.

For almost 20 years, VinylPlus has led the way towards a circular economy by improving the sustainability performance of PVC. I am pleased to report growing recognition for the credibility we have gained over the years with institutions and in the markets and for our achievements in controlled-loop management. Notably, VinylPlus was highlighted as a case study in the Resources and Waste Strategy for England policy published in December 2018.

I am really pleased to announce that the volume of recycled PVC reached 740,000 tonnes in 2018, a 15.6% rise from the previous year. That was achieved in spite of increasing constraints at the regulatory level. A balanced and harmonised legislative framework for the recycling of plastics is essential to secure our contribution to the circular economy and to achieve our demanding new recycling targets. We will enhance our continuous engagement with regulators and institutions to demonstrate that the safe and responsible recycling of products containing legacy additives is the best waste management option from both a health and an environmental point of view.

In 2018, our sustainability programme has taken many steps forward at all levels. I would like particularly to underline the success of our VinylPlus® Product Label in helping companies promote their contributions to sustainability and to a circular economy. I would also like to mention the engagement of VinylPlus in the Cooperation Agreement signed with the social partners. This resulted in concrete initiatives and action plans for workers' safety in production and recycling plants and for the digitalisation of small and medium-sized enterprises (SMEs).

Finally, it is with great sadness that we learned of the recent death of Professor Alfons Buekens, who retired in December as Chairman of the Monitoring Committee and passed away on 19 February. Over the course of 16 years, Professor Buekens provided much valuable advice and guidance to VinylPlus, making indispensable contributions to the success of our Voluntary Commitments.

I would like to welcome Professor Jo Dewulf as the new Chairman of the Monitoring Committee. I'm sure that his experience will prove invaluable to the committee as he guides its work in the future.

Stefan Sommer

Chairman of VinylPlus

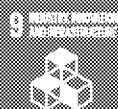
CHALLENGE 1

CONTROLLED-LOOP MANAGEMENT:

“

We will work towards the more efficient use and control of PVC throughout its life cycle.⁹

VINYLPLUS' CHALLENGE 1 CONTRIBUTES TO THE FOLLOWING SUSTAINABLE DEVELOPMENT GOALS¹⁰:



TARGET 9.5



TARGET 12.5



TARGET 13.1

PVC windows provide excellent thermal insulation.



RECYCLING ACHIEVEMENT

In 2018, 739,525 tonnes of PVC waste were recycled within the VinylPlus framework, a 15.6% increase compared to the previous year.

The contribution from Recovinyl¹¹ was 734,568 tonnes, which were entirely recycled in Europe. During the year, Recovinyl further sharpened its certification and audit schemes to ensure maximum reliability of collected data and of recyclates traceability, both from recyclers and converters.

Thanks also to the experience gained by recyclers working with Recovinyl, audits and on-site visits showed a significant general improvement in the professionalism of the recyclers network and in the quality of the recyclates.

In Europe, the demand for recycled rigid PVC is currently very high compared to the supply, indicating the potential for further strengthening collection and recycling schemes.

Industry-Sector Projects for PVC Waste Management

With 326,276 tonnes recycled in 2018, window profiles and related building products accounted for 44% of the total PVC recycled.

In 2018, EPPA¹² actively supported the VinylPlus® Product

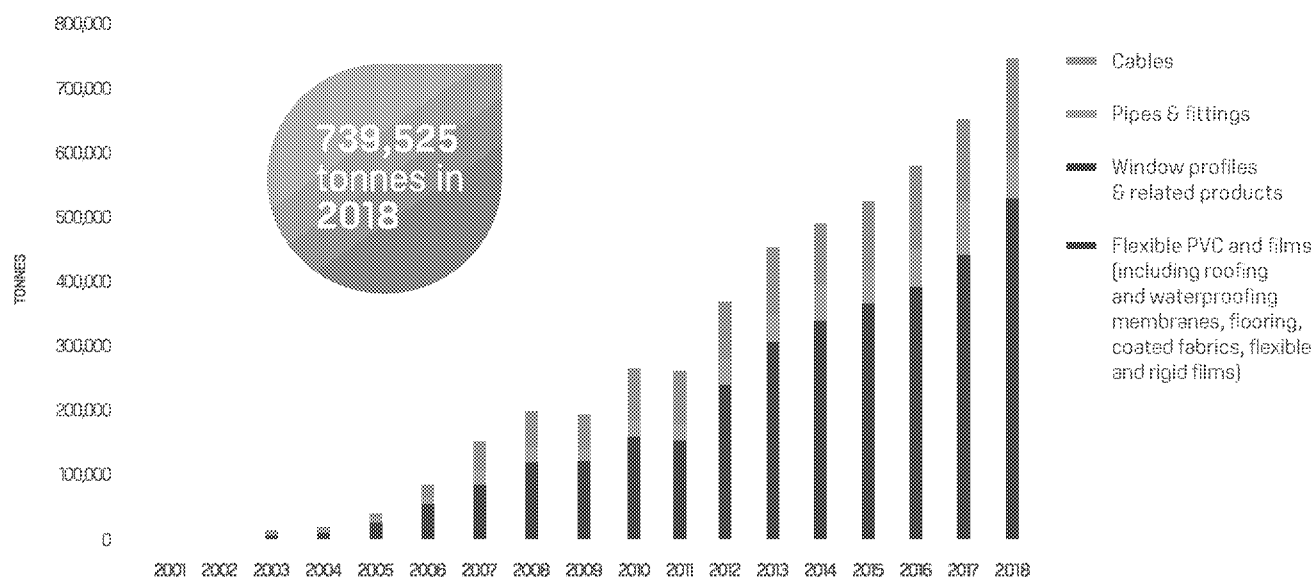
⁹ Targets, deadlines and status of achievement are summarised in Appendix, p. 32

¹⁰ <http://www.un.org/sustainabledevelopment/sustainable-development-goals/>

¹¹ Set up in 2003, Recovinyl is the organisation aimed at facilitating PVC waste collection and recycling in the framework of the European PVC industry's Voluntary Commitments (www.recovinyl.com)

¹² EPPA: European PVC Window Profile and Related Building Products Association (www.eppa-profiles.eu)

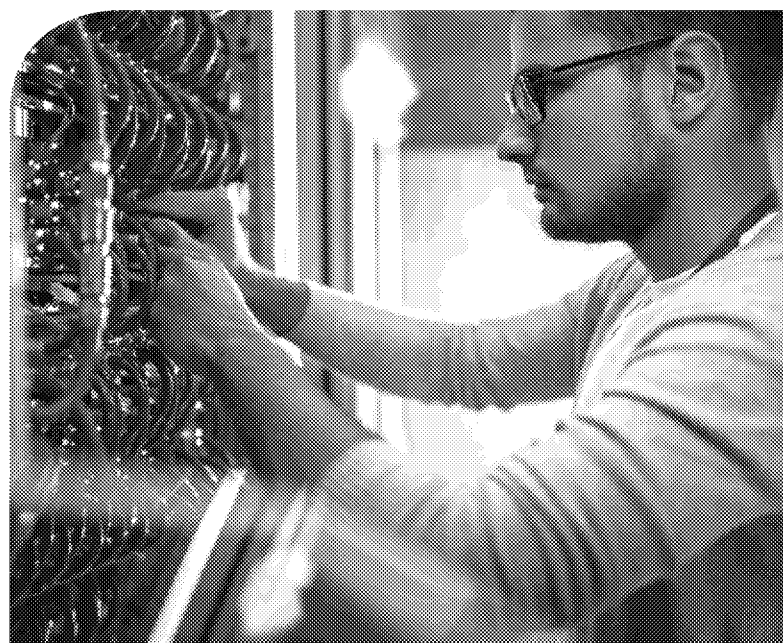
PVC RECYCLED WITHIN THE VINYL 2010 AND VINYLPLUS FRAMEWORKS



Label's implementation and promotion. This included support for member companies in audit preparation, promotion of the label with national and European public officers, as well as media relations activities to communicate the label to a wider audience. The *Hybrid Project*, aimed at classifying and improving the recyclability of PVC hybrid profiles currently found on the market, entered its second phase, in which guidelines were developed on how to increase the recyclability of hybrid materials in window profiles. EPPA is currently working with the European standardisation organisation to finalise its proposed standard for *Controlled-Loop PVC Window Recycling*. The results of the *Hybrid Project* will be directly integrated into this standard. To create awareness of the use of R-PVC, EPPA focused its 2018 communication activities on final customers, developing and issuing several brochures. It also continued to inform window manufacturers of VinylPlus activities, including through participation in the sector's main trade fairs. Finally, EPPA continued and extended its monitoring activities to provide the sector with robust information on the use of substances, recyclates and the like.

In 2018, TEPPFA¹³ continued its active participation in the NSRR (North Sea Resources Roundabout) project¹⁴,

contributing to the successful conclusion of the PVC stream pilot-project phase. The NSRR is an international voluntary agreement between Flanders (Belgium), the Netherlands and the UK, which aims to tackle the legal and practical barriers that hamper the trade, transportation and uptake of secondary resources. In February 2018, the

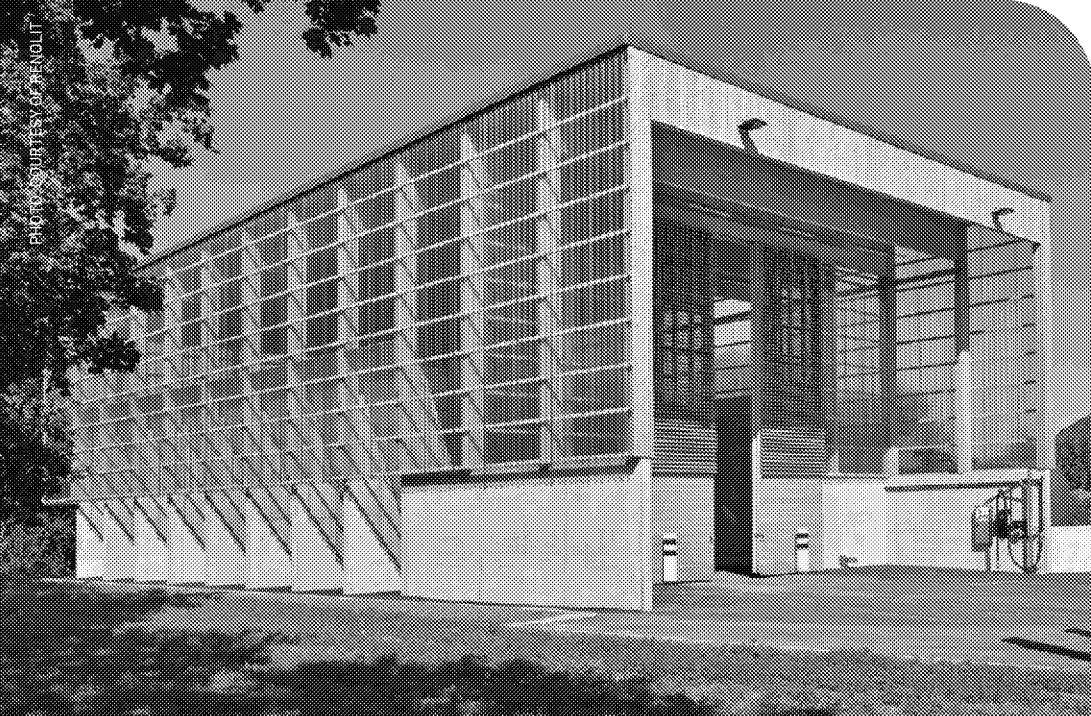


"PVC is widely used in cable insulation, as it has good insulating properties, is easy to use in manufacturing processes and is highly fire resistant. PVC insulation has good mechanical and ageing characteristics, which is very important for cables."

Source: *PVC Waste Treatment in the Nordic Countries*, p. 30, Nordic Council of Ministers, 2019.

¹³ TEPPFA: The European Plastic Pipes and Fittings Association (www.teppfa.eu)

¹⁴ www.circulartory.eu/project/north-sea-resources-roundabout/



In the salt storage facility in Geislingen, Germany, a facade made of salt-resistant PVC corrugated sheets protects the stored salt from wind and weather.

Dutch Ministry of Infrastructure and Water Management issued a legal opinion which clearly defines when rigid PVC waste should still be considered waste, and when it has to be considered a resource for new products. The opinion approves EoW (End-of-Waste) status for rigid PVC recyclates. As a secondary raw material, R-PVC has to comply with REACH¹⁵ when it leaves a recycler's plant. In June 2018, TEPPFA announced its support for Operation Clean Sweep® (www.opcleansweep.org), an international initiative from the plastics industry to reduce plastic pellet and powder loss to the environment. The initiative aims to ensure that the plastic pellets, flakes and powders that pass-through manufacturing facilities are handled with care and do not end up in rivers or the sea.

ReVinylFloor (www.revinylfloor.org) is the organisation set up to stimulate sustainable controlled-loop solutions for the recycling and recovery of post-consumer PVC flooring in Europe. ReVinylFloor is currently expanding and strengthening its existing networks as well as its cooperation with the value chain to stimulate the separate collection and high-quality sorting of floor covering waste. This includes support for the research and development of further commercial applications for recyclates in Europe, as well as the optimisation of mechanical recycling options and the testing of chemical recycling for some specific streams. The creation of a ReVinylFloor quality brand for products containing at least 50% recycled PVC is also under evaluation.

In 2018, AgPR¹⁶ collected around 1,800 tonnes of PVC waste for recycling in Germany and continued its communication



Resilient PVC flooring is ideal for sport facilities thanks to its elasticity, safety and comfort.

activities, including cooperation with other German PVC associations. In total, 2,387 tonnes of PVC flooring were recycled in the VinylPlus framework in 2018.

ESWA¹⁷ recycled 3,531 tonnes of roofing and waterproofing membranes in 2018 through its project Roofcollect® (www.roofcollect.com), in line with its targets. In 2019, ESWA will take part in the pilot trials of the Oreade project, to test the treatment of roofing membranes.

Through its recycling initiatives, IVK Europe¹⁸ continued in 2018 to support the collection and recycling of soft and rigid PVC films and coated fabrics. Currently, recyclates are used for the manufacture of sheets for different applications in building and construction,

¹⁵ Registration, Evaluation, Authorisation and restriction of Chemicals (Regulation (EC) No 1907/2006)

¹⁶ AgPR: Arbeitsgemeinschaft PVC-Bodenbelag Recycling (Association for the Recycling of PVC Floor-Coverings – www.agpr.de)

¹⁷ ESWA: European Single Ply Waterproofing Association, an EuPC sectoral association (www.eswa.be)

¹⁸ IVK Europe: Industrielverband Kunststoffbahnen e.V. (Plastic Sheets and Films Association – www.ivk-europe.com)

as with horse-riding sheets, and in horticulture and agriculture, one example being greenhouse floorings.

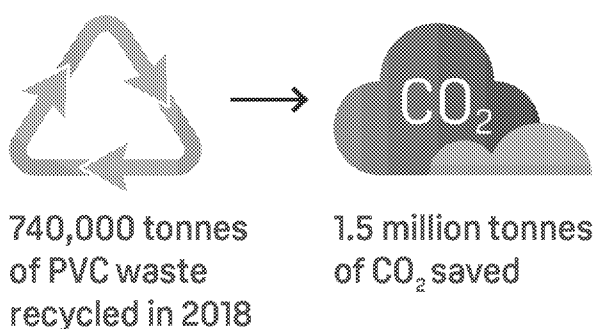
Other Recycling Projects

The Oreade chemical recycling project, which targets PVC waste streams that cannot be handled by mechanical recycling in an economical way, entered a large-scale pilot phase. The process, which is being studied at the Oreade-Suez¹⁹ plant in France, combines energy recovery and chemical recycling. Following the promising results of the 2017-2018 small-scale test trials, in 2019 large-scale trials with 2,000 tonnes of PVC will focus on waste streams with different chlorine concentrations.

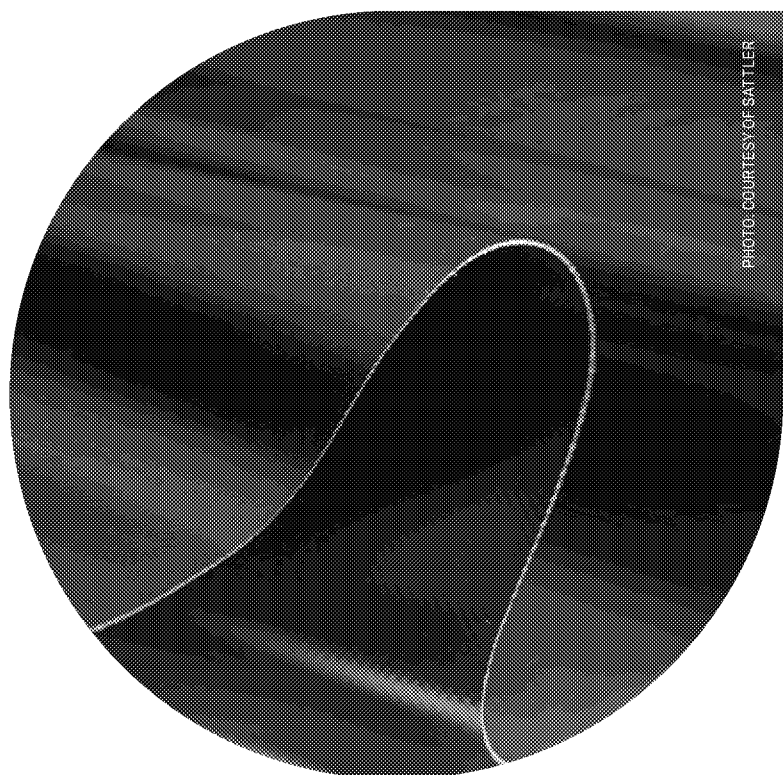
The Resysta[®] recycling consortium (www.resysta.com/en) produces a recyclable wood-like material based on rice husks and PVC. In 2018, Resysta intensified its communications activities to promote and communicate its applications, including its new UPB[®] Board (Universal Performance Board). In order to build controlled-loop materials, Resysta set up dedicated waste collection points across Europe.

RecoMed is the partnership project between the British Plastics Federation (BPF²⁰) and Axion²¹ aimed at collecting and recycling non-contaminated used PVC medical devices from UK hospitals, including face masks and tubing. To date, 28 hospitals are involved in the scheme and another 27 are ready to join. Since its launch, RecoMed has collected and recycled 12,037 kg of PVC waste (including 6,158 kg just in 2018), equal to 385,440 sets of oxygen masks and tubing.

VINYLPLUS RECYCLING ACHIEVEMENTS



PVC coated fabrics and technical membranes are used for textile architecture, halls and tents, but even biogas storage.



WREP (Waste Recycling Project) was launched in 2016 by PVC Forum Italia²² to assess the improvement potential for PVC recycling in Italy and to promote the development of pilot PVC waste collection and recycling schemes. The analytical phase was completed and companies for the pilot projects were identified and selected together with Veritas, the major municipal multi-utility operating in the Venice area (www.gruppoveritas.it), and DAE, the Recovinyl Regional Representative of Italy. In 2018, activities until August focused on preparing the operational phases of the pilot projects. Several organising meetings were held with the selected companies, and training courses were organised for the staff of the municipal collection centres and for the personnel responsible for PVC selection. Operations started in the autumn and by the end of the year 11.5 tonnes of PVC had been collected and appropriately separated in the four selected collection centres. Based on these preliminary data and considering that about 800,000 citizens live in the area managed by Veritas, the availability of PVC waste can be estimated at about 250 tonnes/year in the Venice area and at 15,000-20,000

¹⁹ <http://www.industriesduhavre.com/industries/oreade.html>

²⁰ BPF: British Plastics Federation, the leading trade association for the UK Plastic Industry (www.bpf.co.uk)

²¹ Axion: circular economy specialists (www.axiongroup.co.uk)

²² PVC Forum Italia: the Italian association of the PVC value chain (www.pvcforum.it)

tonnes/year at the national level. These quantities, which are currently going to landfill, could potentially be collected and recycled in partnership with the municipal collection centres, in addition to the quantities already recycled in Italy through the Recovinyl network. The project, which is continuing in 2019, was officially presented at the RemTech Expo 2018 in Ferrara and to the Italian Ministry of the Environment.

PVC windows provide high levels of acoustic insulation deriving from the physical and mechanical characteristics of the polymer and from the profile assembly technology.



LEGACY ADDITIVES

Legacy additives are substances that are no longer used in new PVC products but that can be present in recycled PVC. Since the use of legacy additives may be restricted by legislation, VinylPlus is committed to addressing the issue in cooperation with regulatory authorities.

Over the years, VinylPlus has contributed to discussions on legacy additives by supporting research and a considerable number of studies. Several substances were

investigated (e.g. cadmium compounds, lead stabilisers, and DEHP) from several angles. These ranged from worker safety and emission potential to risk assessment models (leaching outdoors and during waste storage, and the resulting human exposure) and socio-economic analysis. Studies are also on-going on substances such as antimony trioxide, titanium dioxide and ADCA which might be subject to restrictions in the future.

Lead Restriction

ECHA is currently working on the restrictions under consideration for PVC that contains lead compounds. ECHA's initial proposal considered a threshold of 0.1% lead content for articles not containing recycled PVC. For some building and construction articles produced from recycled PVC, there would be a 15-year derogation with a higher limit of lead content for articles using PVC recyclates containing it.

In their opinions²³, respectively adopted on 5 December 2017 and 15 March 2018, ECHA's Committees for Risk Assessment (RAC) and Socio-economic Analysis (SEAC) confirmed that recycling should be considered as an appropriate risk management measure. They proposed a revision of the lead content limits for articles containing recycled PVC, to 1% for soft PVC and up to 2% for rigid PVC. A condition for these revised limits would be that, in soft applications and in specific rigid applications, the lead-containing recycled PVC be entirely encapsulated within a layer of virgin PVC.



²³ <https://echa.europa.eu/documents/10162/86b00b9e-2852-48d4-5fd7-be1e747ad71a>

²⁴ RDC Environment: Belgian consulting company (www.rdcenvironment.be)

²⁵ <https://echa.europa.eu/applications-for-authorisation-previous-consultations>

In PVC flooring, colours represent a functional, aesthetic but also 'humanising' element.

In 2018, RDC Environment²⁴ carried out an evaluation study, *Technology and Economic Feasibility of Soft PVC Encapsulation*. This study concluded that, while technically feasible for sheets (multilayers), the cost of encapsulation would be prohibitively expensive except for higher-value products. For most of the remaining products (traffic management, roofing tiles, boots for professional use), the technical feasibility of encapsulating the recyclates within layers of virgin PVC is unknown or at least not readily available. Most probably, it is excessively expensive.

DEHP Authorisation

VinylPlus supported the companies VinylLoop® and Plastic Planet in the development of their DEHP authorisation review dossiers²⁵. Studies demonstrate adequate control of the recycling of soft PVC containing DEHP, as well as socio-economic benefits. The submitted Chemical Safety Reports document the safe use (for workers and consumers) of DEHP in current recycled soft PVC applications. In September 2018, ECHA's committees published a consolidated opinion in favour of extending the authorisation for seven years.

CONTROLLED-LOOP COMMITTEE

Recycling remains a crucial aspect of the VinylPlus Programme, especially in consideration of the development of EU policies affecting the plastics sector



"Compared to the alternative materials, PVC pipes are more energy-effective during production and are cost-effective in terms of durability and maintenance-free lifetime of service. PVC pipes are more durable than alternative materials and are very applicable for water, waste and drainage systems as their service time is considered to be in the range of hundreds of years."

Source: *PVC Waste Treatment in the Nordic Countries*, p. 29, Nordic Council of Ministers, 2019.



and the drive towards a circular economy. Regulatory constraints on legacy additives, particularly lead and DEHP, are considered a major threat to the recycling of post-consumer waste by all sector groups.

The closure of the VinylLoop® PVC recycling business in Ferrara, Italy, announced in June 2018, was one example. It was a consequence of a collapse in the demand for recycled PVC due to increased regulatory pressure related to the DEHP plasticiser. Removing DEHP from the recycled product is not currently feasible on an industrial scale. Despite authorisation being granted for VinylLoop®, the additional burdens that REACH created for downstream users, such as biomonitoring of their staff, were seen as unacceptable by VinylLoop® customers.

In spite of the uncertain regulatory framework for legacy additives, in 2018 the VinylPlus Controlled-Loop Committee (CLC) confirmed its recommendation to maintain the target of recycling 800,000 tonnes of PVC waste per year by 2020. The CLC remains confident that the ever-increasing number of studies in support of PVC recycling and of the safety of recycled products can lead to balanced

In the framework of VinylPlus, 326,276 tonnes of PVC window profiles were recycled in 2018.

Recycling is a critically important aspect of the VinylPlus Programme.



solutions that combine maximum safety with increased potential for recycling. The current restriction proposal on lead legacy additives would jeopardise the recycling of around 130,000 tonnes of applications, mainly in soft PVC. That would put around 1,000 jobs at stake and considerably increase societal costs for disposal via other routes.

A considerable number of studies have contributed to discussions of legacy additives over the years, including The Natural Step's February 2018 sustainability analysis, *Legacy Additives in Rigid PVC and Progress Towards Sustainability – A Close Look at Recycling and the Circular Economy in Europe*. On the basis of these studies, the CLC remains convinced that the recycling of PVC

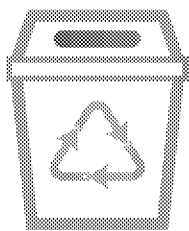
waste from building and construction products offers a manageable and cost-effective way to keep legacy additives in their safest place, both for human health and for the environment. Recycling also represents the best option in terms of resource- and energy-efficiency, as well as in terms of the waste treatment hierarchy.

Trusting that PVC recycling will be allowed to continue and develop, VinylPlus announced two new commitments in 2018. In January, VinylPlus and five other organisations from the European plastics value chain jointly committed²⁶ to further expand existing plastics recycling activities in cooperation with the European Commission. They agreed to contribute to the recycling and reuse of 50% of all plastics waste by 2040, as well as of 70% of plastic packaging.

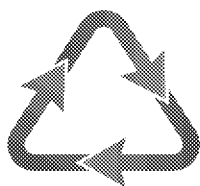
In September 2018, VinylPlus backed the European Commission's call for industry pledges to increase the recycling of plastics by committing to recycle at least 900,000 tonnes of PVC per year into new products by 2025 and a minimum of one million tonnes per year by 2030.

In consideration of this new commitment, the CLC asked the consultancy Conversio (www.conversio-gmbh.com) to develop a new model for making dynamic estimates of the post-consumer waste that will be available for recycling in the 2020-2030 period.

COMMITTED TO RECYCLING



**50% of all
plastics waste
by 2040**



**1 million tonnes
of PVC waste by
2030**

²⁶ The European Plastics Industry Circular Economy Voluntary Commitments. Towards 50% Plastics Waste Recycling (<https://vinylplus.eu/documents/46/60/The-European-Plastics-Industry-Circular-Economy-Voluntary-Commitments>)

2

CHALLENGE

ORGANOCHLORINE
EMISSIONS:

“

We will help to ensure that persistent organic compounds do not accumulate in nature and that other emissions are reduced.²⁷

VINYLPUS' CHALLENGE 2
CONTRIBUTES TO THE
FOLLOWING SUSTAINABLE
DEVELOPMENT GOALS²⁸:



TARGET 1.5



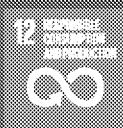
TARGET 3.9



TARGET 8.8



TARGET 9.4

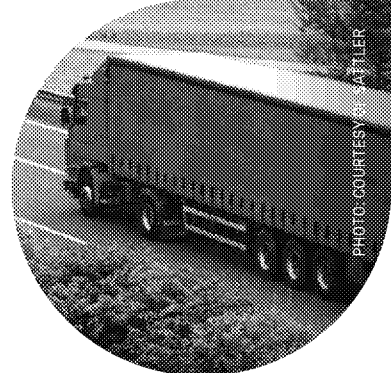


TARGET 12.4

9,573 tonnes of PVC coated fabrics
were recycled in 2018 in the framework
of VinylPlus.

SAFE TRANSPORT

There were no transport accidents in
Europe with VCM release in 2018.

PVC RESIN INDUSTRY
PRODUCTION CHARTERS

The Industry Charters²⁹ for suspension (VCM and S-PVC Charter) and emulsion (E-PVC Charter) PVC are aimed at reducing environmental impact in the production phase. The PVC resin industry is committed to achieving 100% compliance by the end of 2020.

The final compliance audit will include additional parameters in relation to the Operation Clean Sweep® programme that all ECVM member companies have adopted. An auditing tool has been specifically adapted for ECVM members to take into account the characteristics of PVC resin as a powder and with a density greater than 1, which means that PVC resin sinks in water rather than floating like most other thermoplastics. An update of the Industry Charters is currently being considered.



Operation Clean Sweep® includes concrete actions to minimise accidental loss of plastic pellets and powder in the environment, such as truck washing.

²⁷ Targets, deadlines and status of achievement are summarised in Appendix, p. 32

²⁸ <http://www.un.org/sustainabledevelopment/sustainable-development-goals/>

²⁹ The ECVM Industry Charters are available at https://pvc.org/wp-content/uploads/2019/03/ECVM_Charter_VCM_PVC.pdf and https://pvc.org/wp-content/uploads/2019/03/Emulsion-PVC_Charter.pdf

3

CHALLENGE

SUSTAINABLE USE
OF ADDITIVES:

“

We will review the use of PVC additives and move towards more sustainable additive systems.³⁰

VINYLPLUS' CHALLENGE 3 CONTRIBUTES TO THE FOLLOWING SUSTAINABLE DEVELOPMENT GOALS³¹:

6 CLEAN WATER AND SANITATION



TARGET 6.3

12 RESPONSIBLE CONSUMPTION AND PRODUCTION



TARGET 12.4

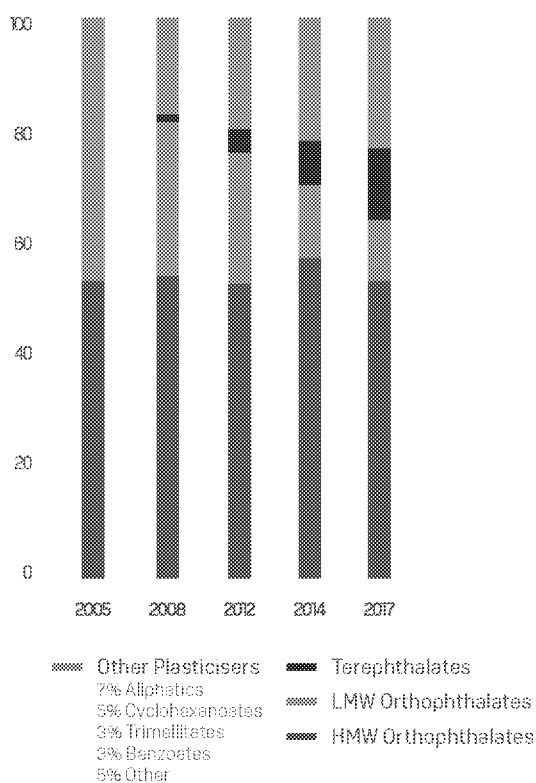


PVC coated textile fabrics can be used to produce flexible ventilation ducts for mines and tunnels.

PLASTICISERS

Updated estimates by European Plasticisers confirm a constant growth in the use of high molecular weight (HMW) orthophthalates, cyclohexanoates, terephthalates and other plasticisers in Europe, together with a progressive decline in the use of low molecular weight (LMW) orthophthalates.

EUROPEAN MARKET TRENDS (2017)

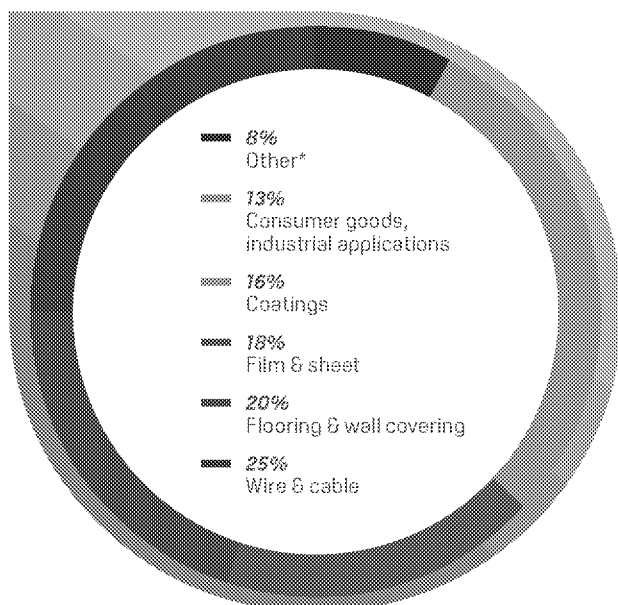


SOURCE: 2018 IHS and European Plasticisers estimates

³⁰ Targets, deadlines and status of achievement are summarised in Appendix, p. 32

³¹ <http://www.un.org/sustainable-development/sustainable-development-goals/>

EUROPE'S PLASTICISERS USE (2017)



*OTHER: elastomers, surface coatings, rubber compounds and medical applications

SOURCE: 2018 IHS and European Plasticisers estimates

Studies and Research

The European Plasticisers' scientific project, co-funded by VinylPlus, to develop a PBPK (physiologically based pharmacokinetic) model for plasticisers has been completed for DINP. First results were presented and further steps were discussed at the International

Workshop hosted by European Plasticisers in Speyer, Germany, in September 2018. An article is in preparation for publication in peer-reviewed journals. Preliminary data are available for PBPK models for DINCH and DEHTP. PBPK model development is ongoing for DPHP. For DEHA and DINA, blood concentrations have to be measured before model development is continued. PBPK models will put into perspective epidemiological studies dealing with the association between exposure and symptoms, and support the demonstration of safe use of plasticised PVC.

Regulatory Updates

A restriction proposal³² on DEHP, BBP, DBP and DIBP by the European Chemical Agency (ECHA) and Denmark was adopted³³ by the European Commission in December 2018. It will enter fully into force in July 2020.

As already reported in last year's Progress Report³², ECHA's Risk Assessment Committee by consensus "agreed not to classify DINP for reproductive toxicity" in its March 2018 opinion³⁴ on the Danish proposal for DINP classification. The Danish EPA stated that it takes note of the Risk Assessment Committee's opinion and will not pursue the matter further. The European Commission confirmed that this dossier is now closed. In an interview with a German radio, a representative of the German Federal Risk Institute confirmed³⁵ that DINP had been "adequately tested and we were unable to identify any

³² Also see p. 16 of VinylPlus Progress Report 2018

³³ Commission Regulation (EU) 2018/2005

³⁴ https://echa.europa.eu/documents/10162/23821863/nr_annex_rac_saac_march.pdf/fcc8fe3c-1221-93ad-0fe0-e5772436e97c

³⁵ https://www.deutschlandfunk.de/umweltgifte-welche-dosis-macht-das-gift.740.de.html?dramarticle_id=421157

In hospitals, PVC flooring, with its resilient, smooth, compact and free from roughness surface, significantly reduces risk of bacterial retention and multiplication.





"As PVC materials are high performance and low cost, they enable the manufacturing of many single use medical devices, which effectively replaced the traditional rubber and glass products that demanded cleaning and sterilization before re-use."

Source: *PVC Waste Treatment in the Nordic Countries*, p. 31, Nordic Council of Ministers, 2019.

CRITERIA FOR THE SUSTAINABLE USE OF ADDITIVES

The ASF (Additives Sustainability Footprint) is the methodology developed by the VinylPlus Additives Committee and The Natural Step³⁶, to evaluate the use of additives in PVC products from the perspective of sustainable development.

In 2018, the ASF underwent a critical review by Prof. Adisa Azapagic, Professor of Sustainable Chemical Engineering at the University of Manchester, UK. The main strengths of the method were identified as the life-cycle, multi-stakeholder, forward-looking and innovation-oriented approach and the alignment with the ISO 14040 standard. The largely qualitative character of the method and its reliance on a variety of data and sources were identified as main shortcomings. Taking this review into account, two articles were prepared by Dr Mark Everard³⁹ and The Natural Step for publication in peer-reviewed chemistry and sustainability journals.

dangerous substance properties and therefore any risk for the consumer... Accordingly REACH gave the all-clear signal for the most important phthalate".

The ECHA Risk Assessment Committee also expressed support³⁶ for the structure activity differences between low molecular weight phthalates (DEHP, BBP, DBP, DIBP), which show adverse reproductive effects in animal studies, and high molecular weight phthalates (DINP, DIDP, DPHP), which do not show adverse reproductive effects in such studies.

For DOTP, ECHA has recently included on its website an update³⁷ for the Regulatory Management Options Analysis (RMOA), confirming the previous conclusions by France that there is *"no need to initiate further regulatory action at this time"*.

Four additional plasticisers (DINCH, BTHC, TOTM/TEHTM and DOTP/DEHTP) have been included in the 2019 edition of European Pharmacopoeia.

Authorisation for the manufacture and use of virgin DEHP is still pending.

Following completion of the first ASF for window profiles together with EPPA in 2017 and its inclusion in the VinylPlus® Product Label scheme, online courses providing a shared understanding of the assessment approach and digital tools facilitating the assessment were developed in 2018. These tools were then used to initiate an ASF assessment with ReVinylFloor on a generic flooring product. ESPA's Life Cycle Assessment (LCA) for liquid mixed-metals stabilisers (used in flexible PVC applications) is ongoing with two additional LCAs under development by VITO⁴⁰.

PVC flooring combines slip resistance with high durability for years of performance in wet conditions, for both booted and barefoot users.



36: https://echa.europa.eu/documents/10162/22639445/RAC44_FinalMinutes.pdf/18181581-17C6-a55d-cd8c-51cf15fe0006 and <https://echa.europa.eu/documents/10162/03fc2a71-f3b-09ad-e6ad-7cde561d6d5e>

37: <https://echa.europa.eu/it/rmoa/-/dislist/details/6b0236e1909b6287>

38: Sustainability NGO acting as critical friend and sustainability advisor to VinylPlus (www.thenaturalstep.org)

39: Associate Professor of Ecosystem Services, University of the West of England (www.uwe.ac.uk)

40: VITO: Vlaamse Instelling voor Technologisch Onderzoek (Flemish Institute for Technological Research – www.vito.be)

4

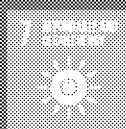
CHALLENGE

SUSTAINABLE USE OF
ENERGY AND RAW MATERIALS:

“

We will help to minimise climate impacts through reducing energy and raw material use, potentially endeavouring to switch to renewable sources and promoting sustainable innovation.⁴¹

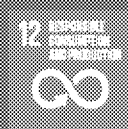
VINYLPLUS' CHALLENGE 4
CONTRIBUTES TO THE
FOLLOWING SUSTAINABLE
DEVELOPMENT GOALS⁴²:



TARGET 7.3



TARGET 8.4



TARGET 12.2



TARGET 13.1



"The PVC material is strong, durable, lightweight and versatile; thus makes it a perfect material for many applications. More than 75% of the PVC is used in industrial applications and especially the building and construction sector where PVC products have long life span of 10-year and beyond."

Source: PVC Waste Treatment in the Nordic Countries, p. 28, Nordic Council of Ministers, 2019.

ENERGY EFFICIENCY

PVC resin producers are committed to diminishing their energy consumption for the production of EDC, VCM and PVC, targeting a 20% reduction by 2020.

In 2018, IFEU⁴³ completed a new verification of ECVm members' energy consumption data for 2015-2016.

The energy needed to produce one tonne of PVC decreased by an average of 9.5% compared to the baseline period 2007-2008. Since there was an apparent setback compared to the previous verification of consumption data, which was

⁴¹ Targets, deadlines and status of achievement are summarised in Appendix, p. 32

⁴² <http://www.un.org/sustainabledevelopment/sustainable-development-goals/>

⁴³ IFEU: Institut für Energie- und Umweltforschung Heidelberg GmbH
(German Institute for Energy and Environmental Research – www.ifeu.de)

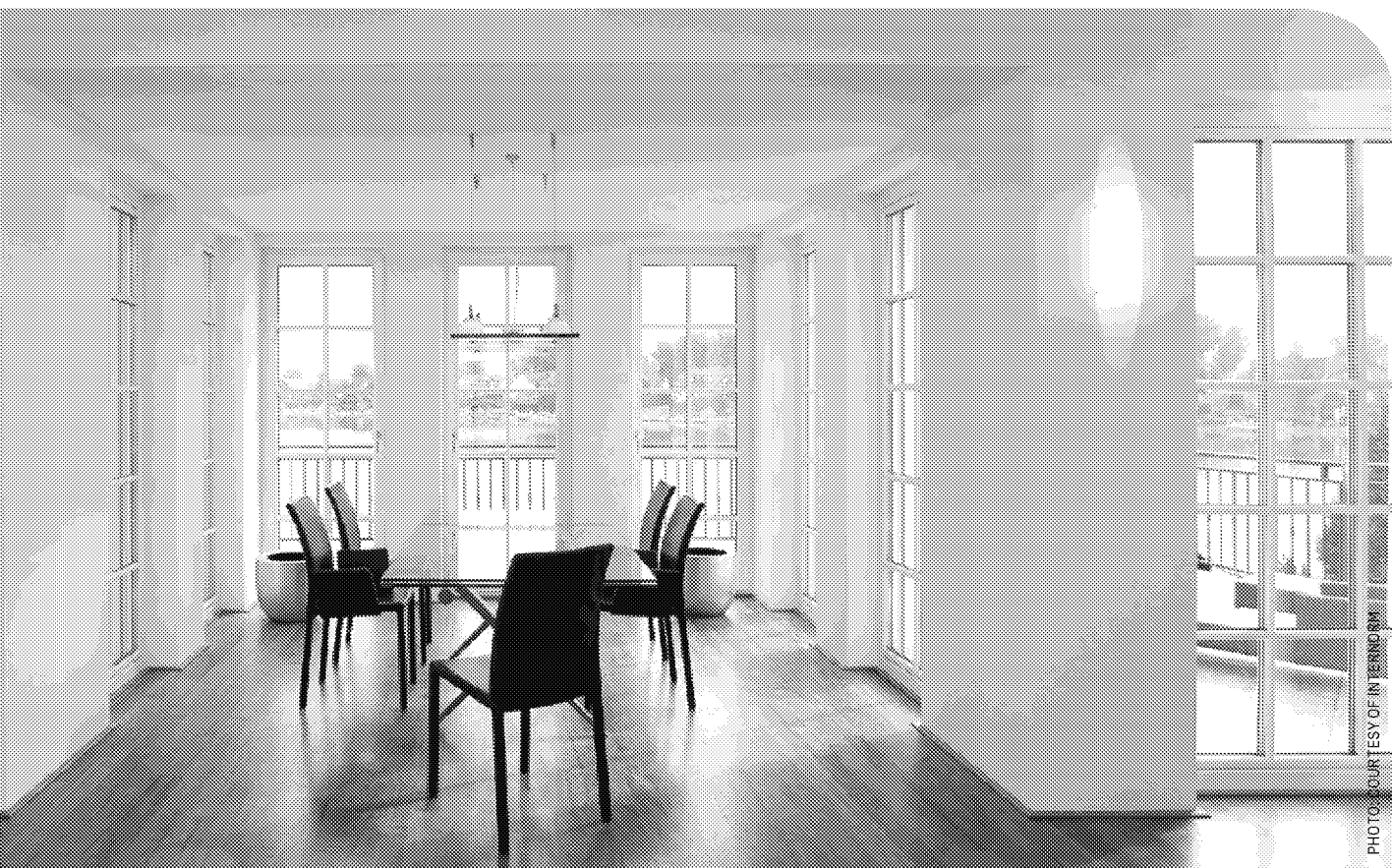


PHOTO COURTESY OF INTERISM

PVC window profiles play an important role in reducing energy losses in buildings.

for 2012-2013 and showed a 10.2% decrease, verifications are ongoing to investigate the reasons for this result. Preliminary indications showed that one of the reasons could be changes in production plants' set, which weighted for a 0.5%.

In addition to the above-mentioned reduction in energy demand, IFEU investigated the reduction of CO₂ emissions for the average PVC production, based on the energy demand of the respective processes. The resulting CO₂ reduction between the baseline period and 2015-2016 is 14.4% for the average PVC product, including VCM.

In 2018, the evaluation continued of the data available for each EuPC sector group to assess PVC converters' energy consumption.

RENEWABLE RAW MATERIALS

VinylPlus continued monitoring developments in the production of PVC resin and additives from renewable raw materials. It will produce an updated Status Report by the end of 2020.

PVC sheets act as protection from the rain in architectural structures: public and private, industrial, sport or farming buildings.



PHOTO COURTESY OF ILLUMIN

5 CHALLENGE

SUSTAINABILITY AWARENESS:

“We will continue to build sustainability awareness across the value chain – including stakeholders inside and outside the industry – to accelerate resolving our sustainability challenges.”⁴⁴

VINYLPLUS' CHALLENGE 5 CONTRIBUTES TO THE FOLLOWING SUSTAINABLE DEVELOPMENT GOALS⁴⁵:

 3 GOOD HEALTH AND WELL-BEING TARGET 3.9	 4 QUALITY EDUCATION TARGET 4.4 TARGET 4.7	 5 GENDER EQUALITY TARGET 5.1
 8 DECENT WORK AND ECONOMIC GROWTH TARGET 8.8	 12 RESPONSIBLE CONSUMPTION AND PRODUCTION TARGET 12.6 TARGET 12.7 TARGET 12.8 TARGET 12.9	 17 PARTNERSHIPS FOR THE GOALS TARGET 17.7 TARGET 17.16 TARGET 17.17

STAKEHOLDER DIALOGUE AND COMMUNICATIONS

VinylPlus is committed to raising awareness of sustainability at all points in the value chain, as well as among other stakeholders – whether they be inside or outside the PVC industry. To cascade further VinylPlus progress within the value chain and inspire an increasing number of companies in Europe, three national organisations (AGPU in Germany, BPF in the UK and PVC Forum Italia) joined VinylPlus in 2017 as associate members to share resources and expertise and help VinylPlus to step up its efforts. In addition, VinylPlus France was set up as a new platform in 2018, bringing together the main French associations of PVC producers and converters.

VinylPlus also promotes frank and open dialogue with all stakeholders, third parties, institutions and organisations in different communities – technical, political and social. Thanks to the credibility gained with institutions and in the markets over the years, and to VinylPlus' achievements in waste and resource management, the Danish Parliament in November 2018 approved a resolution lifting a tax on soft PVC that had been in place for 20 years. In addition, VinylPlus was highlighted as a case study in the *Resources and Waste Strategy for England*⁴⁶ published in December 2018.

⁴⁴ Targets, deadlines and status of achievement are summarised in Appendix, p. 32

⁴⁵ <http://www.un.org/sustainabledevelopment/sustainable-development-goals/>

⁴⁶ <https://www.gov.uk/government/publications/resources-and-waste-strategy-for-england#history>, p. 76

Representatives of the City of Madrid, the European Parliament, the European Commission and UNIDO discussing how public policy and industry can best work together to meet societal challenges at the VinylPlus Sustainability Forum 2018.



PHOTO: VINYLPLUS

PVC is one of the most versatile materials available for sport structures, from roofing membranes to piping systems, flooring, windows, cables and seating.

In 2018, VinylPlus also continued to share its approach, achievements and best practices at major international conferences and events. In April, VinylPlus contributed two presentations to the Plastics Recycling Show (PRS) Europe 2018, in Amsterdam, The Netherlands: *Circular solutions with PVC products and Recovinyl, more than just numbers*. PRS is the annual exhibition and conference for plastics recycling professionals organised by PRE⁴⁷.

The 6th VinylPlus Sustainability Forum took place in Madrid, Spain, with the theme *Meeting Societal Needs*. There were more than 140 participants from 30 countries, representing the European Commission, the European Parliament, the United Nations, political decision makers, consumer organisations, academia, specifiers, architects, recyclers and the PVC value chain. They explored how the vinyl sector and its products can provide concrete and sustainable solutions to help meet the wide-ranging challenges of providing essential services for a growing global population in areas such as healthcare, housing, and infrastructure.



PHOTO: COURTESY OF ASP ARCHITECTEN

In May 2018, VinylPlus also took part in the workshop Circular Economy and Plastic Strategy organised by PVC Forum Italia at the Plast 2018 exhibition in Milan. Representatives of the Italian Ministries of Environment, Economic Development and Health participated in the panel discussion on EU policies and the Italian regulatory framework, expressing their appreciation for VinylPlus' approach and achievements and for its leading example.

The VinylPlus Voluntary Commitment and its achievements were presented at the 3rd Oxo Conference – Plasticizers and Alcohols Market Outlook in Warsaw, Poland, in November.

To present the statuses of their voluntary commitments and pledges to media, NGOs and representatives of the European Commission, 13 major organisations from the plastics value chain, including VinylPlus, hosted their first joint event in December: The EU Plastics Industries – Towards Circularity.

In March 2019, VinylPlus championed the sustainable use of PVC at the running event She Runs – Active Girls' Lead 2019 (www.sheruns.eu), which gathered 2,500 young women aged 14-18 from 35 countries to race 3 km through the heart of Paris, France. Organised by the International School Sport Federation (ISF), the event aims to promote girls' health, emancipation, and leadership through school sport. VinylPlus' partnership with She Runs – Active Girls' Lead 2019 followed the signature in February of a joint *Environmental Action* charter with ISF, to ensure the sustainable use of PVC at She Runs with six commitments, from sourcing PVC in line with the VinylPlus sustainability programme to ensuring the re-use and recycling of PVC products after the event (https://vinylplus.eu/uploads/Modules/Mediaroom/charter_enandfr_a4_final.pdf).



Laurent Petrynka, President of ISF, Member of the Olympic Education Commission and General Inspector of National Education in France, and Brigitte Dera, VinylPlus General Manager, signing the Environmental Action charter on 12 February 2019.

⁴⁷ PRE: Plastics Recyclers Europe (www.plasticrecyclers.eu)

⁴⁸ SSDC: Sectoral Social Dialogue Committee



Cooperation Agreement of the Social Partners of the European Chemical SSDC⁴⁸ and VinylPlus on the European PVC Industry

In the framework of the Cooperation Agreement signed between VinylPlus and the European Chemical Sectoral Social Partners (made up of ECEG⁴⁹ and industriAll Europe⁵⁰), two priority works, directly linked to the Social Partners' Roadmap 2015-2020, emerged from discussion at the Sectoral Social Dialogue Committee's expert group meeting for chemical industry in Brussels in February 2018:

- 1 Health and safety: analysis of available information, focus on converters and recyclers, identification of knowledge gaps.

To increase stakeholder dialogue, especially with the Social Partners, and to assess how current HSE regulation and voluntary practices can be applied, the sector's needs were discussed at the workshop Health and Safety at PVC Converters and

Recyclers: Status Quo and Launch of Cooperation. The workshop, which took place in Brussels, in May, was co-organised by VinylPlus, ECEG and IndustriAll. Participants included authorities (DG GROW, DG EMPL, DG ENV), trade unions, employers' representative organisations and their experts, HSE managers from PVC converters and recyclers, and Recovinyl Regional Representatives.

The workshop highlighted a lack of awareness of available HSE tools and documents by workers, especially at smaller companies, and the need to raise awareness both of the available HSE tools and documents, and of voluntary best practices. These practices are not well known to SMEs, which focus more on the implementation of regulations. It was therefore agreed to develop new dedicated communications tools, including short videos, and to organise PVC plant visits involving IndustriAll, ECEG and MEPs.

- 2 Sector evolution: PVC value chain contribution to the research study on digitalisation and innovation launched by ECEG and industriAll Europe within the European project VS/2017/0358, entitled *The impact of digital transformation and innovation in the workplace: a sector-specific study of the European chemical, pharmaceutical, rubber and plastics industry in Europe*.

The preliminary results of the research study on digitalisation needs were presented in October 2018.

Social media have a growing importance for VinylPlus' communications and stakeholder engagement. In 2018, VinylPlus activated a new account on the LinkedIn platform.

By the end of 2018, the VinylPlus twitter account @VinylPlus_EU had attracted 1,400 followers.

The number continues to increase.

To expand the scope of VinylPlus' social media engagement, a new Twitter account @VinylPlus_IT in Italian has been operational since September 2016.



VinylPlus @VinylPlus_EU • 11 Oct 2018

"The VinylPlus programme is rooted in transparent and accountable checks to see that we're doing our job" - VinylPlus' Brigitte Dero is this month's @Parlimag Thought Leader on #K4WCD00m00D #CircularEconomy #nextto #recycling

The Thought Leader is sponsored by VinylPlus

THE PVC SECTOR IS HITTING EU RECYCLING TARGETS AND GOING EVEN FURTHER, WRITES BRIGITTE DERO

THE PARLIAMENT MAGAZINE'S

THOUGHT LEADER



⁴⁸ ECEG: European Chemical Employers Group. ECEG is the European employers' organisation representing the interests of the chemical, pharmaceutical, rubber and plastics industries at the European level (www.eceg.org)

⁵⁰ IndustriAll: European Trade Union represents workers across supply chains in manufacturing, mining and energy sectors across Europe (www.industriall-europe.eu)

15% of respondents were from the plastics sector, most of them from the PVC sector. One of the main issues is that most of the companies in the plastics converting sector are SMEs and do not have the resources to provide 'digital' training for their current and new workers (re-skilling and up-skilling).

Since demand for digital skills is going to increase in the coming years, VinylPlus decided to collaborate with ECEG and IndustriAll to support SMEs in their digital transitions.

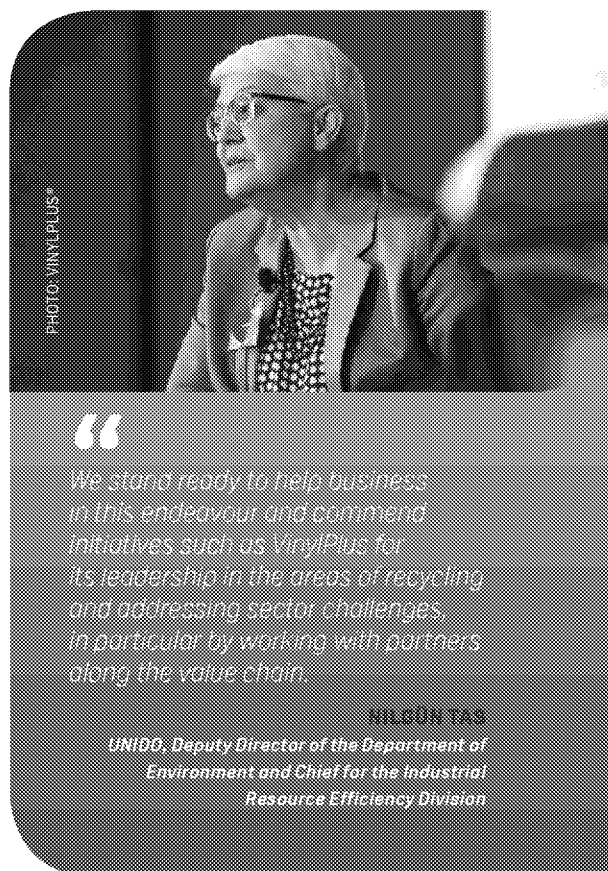
Engaging Globally

As part of the commitment to promote its approach to the worldwide PVC industry, VinylPlus in March 2018 participated in a two-day event in Sydney, PVC Australia 2018: Shaping the Future. VinylPlus' speech focused on the European PVC industry's progress towards sustainability and how its Voluntary Commitment is supporting circular economy objectives for PVC.

In April, in Mumbai, VinylPlus contributed a keynote speech to Vinyl India 2018, the 8th International PVC & Chlor-Alkali Conference. The conference attracted more than 850 participants from around the world.

In September, VinylPlus was invited to speak at the EU-Australia Leadership Forum, an innovative project funded by the European Union and supported by the Australian government. Recognised as a leader and role model for the circular economy and the plastics industry in Europe, VinylPlus participated in a sectoral policy workshop, entitled *Progressing the Circular Economy: European and Australian Perspectives on the Plastics Problem*. The workshop focused on critical, analytical and innovative thinking for the future of the EU-Australia cooperation.

In October, VinylPlus' contribution to the 7th China International Chlor-Alkali Conference focused on *The European PVC Industry: Challenges and Opportunities*. The conference gathered more than 300 delegates from 20 countries to discuss technological innovation and market trends.



“

We stand ready to help business in this endeavour and commend initiatives such as VinylPlus for its leadership in the areas of recycling and addressing sector challenges, in particular by working with partners along the value chain.

HILGÓN TAS

UNIDO, Deputy Director of the Department of Environment and Chief for the Industrial Resource Efficiency Division

VinylPlus also took part in a combined Circular Economy Mission of the EU Commission to Japan and Indonesia. This mission was organised to promote circular economy, sustainable and inclusive innovation and growth in the EU, Japan and Indonesia, as well as green business partnerships. The EU Circular Economy Mission coincided with the second World Circular Economy Forum (WCEF2018), hosted by Japan, where the Mission co-organised a session dedicated to showcasing the potential of circular economy for plastics and exploring opportunities for and barrier to action in the Asia-Pacific region.

VinylPlus also continued to actively share experience, knowledge and best practices with the other regional PVC associations in the GVC (Global Vinyl Council). In 2018, the GVC's bi-annual meetings took place in May in Madrid, Spain, and in October in Kunming, Yunnan, China.

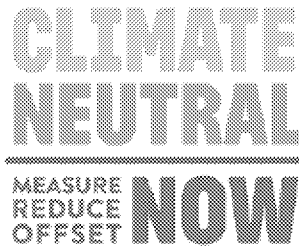
United Nations

In 2018, VinylPlus continued to engage in a proactive dialogue with UN bodies and organisations. In May, Nilgün Tas, Deputy Director of the Department of Environment and Chief for the Industrial Resource Efficiency Division at UNIDO, participated as keynote speaker in the VinylPlus Sustainability Forum.

VinylPlus also joined the UNFCCC's Climate Neutral Now initiative⁵¹ in 2018, signing a pledge for the climate neutrality of its yearly event. Unavoidable emissions caused by holding the VinylPlus

Sustainability Forum 2018 were compensated through the use of United Nations-certified offsets.

VinylPlus continued to share its progress and contributions to the Sustainable Development Goals (SDGs) through yearly reporting on the UN Partnerships for the SDGs Platform⁵².



at 13 European sites⁵⁴. Originally launched for window profiles, the Label is now open to any construction product meeting the definition of the EU Construction Product Regulation. Seven additional companies from several application sectors have already applied for the label.

In March 2019, the VinylPlus® Product Label was validated for accreditation in Italy by Accredia (www.accredia.it/en), the Italian National Accreditation Body (NAB) responsible for the validation of labels (Conformity Assessment Scheme, CAS) and for the accreditation of Certification Assessment Bodies (CAB). An evaluation by the other 35 NABs members of the European Accreditation association (www.european-accreditation.org) has been initiated for a Europe-wide validation. Furthermore, the VinylPlus® Product Label is being evaluated by DGNB (the German Sustainable Building Council – www.dgnb.de/en), the network aimed at promoting sustainable and economically efficient building, as well as by BREEAM, the UK green building standard (www.breeam.org).

VINYLPLUS® PRODUCT LABEL

The VinylPlus® Product Label (<https://productlabel.vinylplus.eu>) is a sustainability labelling scheme for PVC products initially targeted for the building and construction sector. It has been developed by VinylPlus in cooperation with BRE⁵³ and The Natural Step. Its criteria combine elements of BRE's *Responsible Sourcing (BES 6001)* with VinylPlus' five sustainability challenges.

The VinylPlus® Product Label was officially launched at the FENSTERBAU FRONTALE exhibition (www.frontale.de) in Nuremberg, Germany, in March 2018. To date, eight profile manufacturers have been awarded the label for 43 profile systems manufactured



PHOTO: COURTESY OF POLYFLOR

Resistance, functionality, safety and hygiene are undoubtedly the main performance required for flooring intended for common areas, schools and sport structures.

⁵¹ <https://unfccc.int/climate-action/climate-neutral-now/company-organization/climate-neutral-now-signatories>

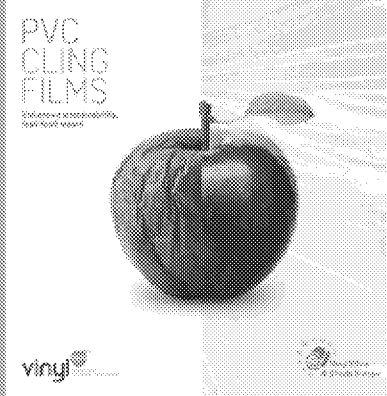
⁵² <https://sustainabledevelopment.un.org/partnership/?p=91>

⁵³ BRE: Building Research Establishment, UK-based certification experts on responsible sourcing for building and construction products (www.bregroup.com)

⁵⁴ <https://productlabel.vinylplus.eu/product-inventory>

VINYLPLUS JOINT COMMUNICATIONS PROJECTS

Every year VinylPlus co-funds a range of projects with the aim of expanding the scope of its communications activities. Eleven projects⁵⁹ were implemented in 2018, by three European industry sector organisations and six national PVC associations.



KEY SUSTAINABILITY PERFORMANCE INDICATORS FOR PVC CLING FILMS FOR FOOD

The project aimed to promote the sustainability advantages of PVC cling films by taking into account the priorities and targets set by the UN SDGs. A major aim was to underline that benefits of PVC cling films are more relevant in terms of contribution to sustainability (e.g. food waste prevention) than the perceived weaknesses. A technical/scientific document was produced by a consulting company specialising in LCA studies to provide the factual basis for a promotional brochure.

PROJECT LED BY VFSE
Geographic scope: EU



PVC ON THE ROAD

This project aimed to raise awareness about the plasticiser and PVC industries among regulators and policymakers. A half-day event was organised in Brussels to provide up-to-date scientific and regulatory information and to present VinylPlus' achievements to Belgian authorities and members of the value chain. Speakers highlighted the benefits flexible PVC applications offer in everyday life and addressed the current regulatory challenges the industry is facing, from a societal, health and environmental standpoint.

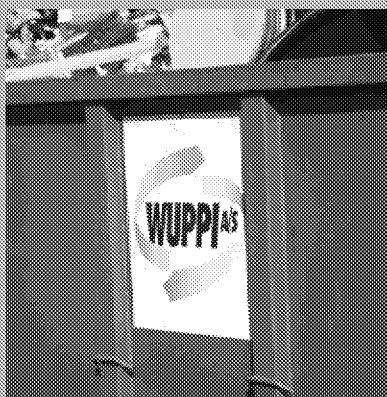
PROJECT LED BY
EUROPEAN PLASTICISERS
Geographic scope: EU



VISUALISATION AND PROMOTION OF THE RECYCLING OF OLD PVC WINDOWS AND THE USE OF RECYCLATES FOR NEW PVC WINDOWS

The general aim of this project was to promote the PVC recycling concept, specifically concerning window profiles, to demolition and waste disposal companies, manufacturers, and the housing and real estate industry. A best practice brochure was produced; on-site press conferences were held, generating media coverage; and key players in the controlled-loop management of PVC were involved, with the objective of expanding the network.

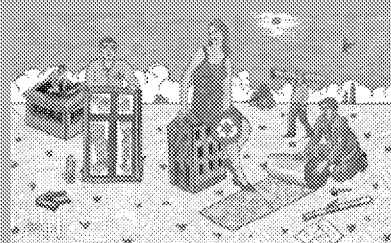
PROJECT LED BY REWINDO⁶⁰
Geographic scope: Germany



PVC BRANDING IN THE CIRCULAR ECONOMY

The project's objective was to achieve recognition from public and private decision makers within the building sector in Denmark for the WUPPI⁶¹ system and VinylPlus' achievements in recycling. Communications activities included newsletters, advertising on LinkedIn and AdWord, participation in exhibitions and seminars, and media relations and social media activities. A training package and marketing materials were also produced.

PROJECT LED BY WUPPI
Geographic scope: Denmark



SHARING GOOD PRACTICES AND CHALLENGES IN THE RECYCLING AND RECOVERY OF PLASTICS INCLUDING PVC

The project aimed to share the plastics industry's best practices and know-how in recycling and recovery and to enhance cooperation with related associations. A one-day workshop was organised with recycling and recovery experts from associations of the plastics industry and the waste management and recovery industry.

PROJECT LED BY ACPU
Geographic scope: Germany

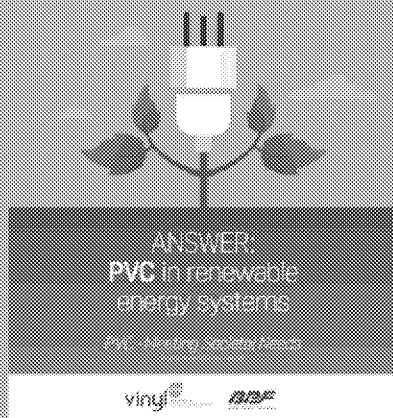
⁵⁹ <https://vinylplus.eu/progress/communications-projects/2018-2>

⁶⁰ Rewindo: the German recycling initiative for PVC windows, doors shutters and related products (www.rewindo.de)

⁶¹ WUPPI: Danish company set up to collect and recycle rigid PVC (www.wuppi.dk)

⁶² KALCI: Entreprises de Revêtement Techniques et Créatives, the French Association of Technical and Decorative Covering Contractors (www.kalci-services.org)

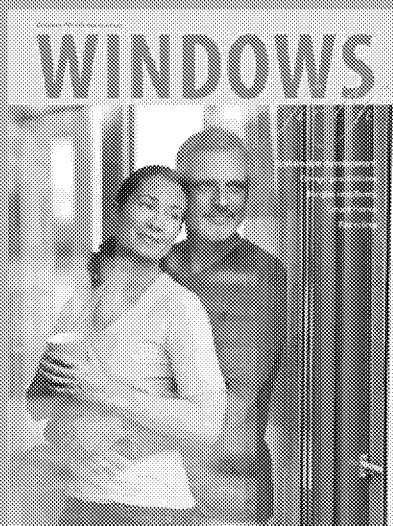
What material saves more energy in its lifetime than is used to manufacture it?



12 MONTHS – 12 REASONS TO CHOOSE PVC

The objective of the project was to engage with industry stakeholders in order to improve the image of PVC, using simple, emotional and fresh communications tools. Twelve infographics were produced depicting VinylPlus' work, including information on topics such as PVC recycling, the circular economy, energy efficiency, cost saving, safety, medical devices and other innovative solutions. The infographics were used for events, digital and online communications, pull-up banners and posters. Promotion of the infographics across various platforms will continue in 2019. They will also be used in promotional materials.

PROJECT LED BY BPF
Geographic scope: UK



WINDOWS FOR LIFE

As part of its communications activities addressed to consumers, EPPA developed a brochure, *Windows for Life*. It gives a comprehensive view on what is important to know about U-PVC windows, from sustainable design and energy saving to smart homes and recycling. This helps the final consumer to make the right choices. One section is dedicated to the VinylPlus Voluntary Commitment and its Product Label.

PROJECT LED BY EPPA
Geographic scope: EU



VINYLPLUS DIALOGUE WITH DECISION MAKERS AND INFLUENCERS

This project aimed to raise awareness of VinylPlus and to open a positive dialogue with real estate management companies, demolition and recycling companies, local authorities and political influencers. AGPU was present with a booth at three main national events: the 21st Internationaler Altkunststofftag Bad Neuenahr, organised by BVSE (the German Federal Association for Secondary Raw Materials and Waste Management); the SPD Party Convention, in Bochum, in June 2018; and the DDIV (Real Estate Management) Conference, in September 2018. In the photo are Svenja Schulze, German Minister for Environmental Affairs, with Thomas Hülsmann, AGPU Director.

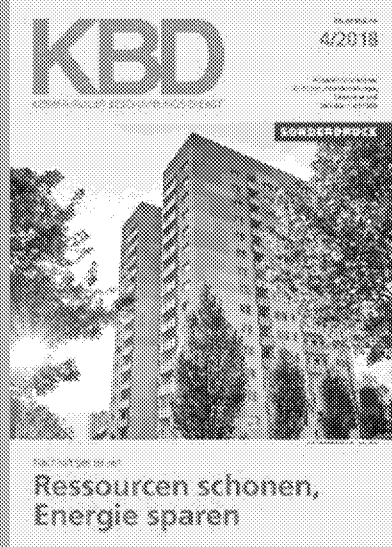
PROJECT LED BY AGPU
Geographic scope: Germany



TURQUOISE

TURQUOISE aims to increase the use of recycled soft PVC in France, both through the development of new markets and applications (indoor, outdoor and agriculture), and through communications and promotion. In February 2018, I-deel (www.i-deel-in.com) won another award, this time for outdoor products from the magazine *Mon Jardin & Ma Maison*. In 2018, I-deel's 100%-recycled PVC applications were presented and promoted through press articles and meetings, by organising product displays in around 40 retail stores and through participation in the AGRIAL exhibition.

PROJECT LED BY KALEP
Geographic scope: France



ENERGY- AND RESOURCE-EFFICIENT PRODUCTS FOR GREEN PUBLIC PROCUREMENT

This project started in 2016 and focused on PVC products providing sustainable solutions in public procurement, thanks to their energy- and resource-efficiency, as well as their low whole-life cost. In addition to the magazine *KBD*, *UmweltMagazin* was selected in 2018 as a media partner for advertorials and technical articles, due to its special relevance for decision makers, local authorities and public procurement operators.

PROJECT LED BY AGPU
Geographic scope: Germany



ACCREDITED VINYLPLUS® PRODUCT LABEL (AVPL): A BUILDING BLOCK OF THE CIRCULAR ECONOMY

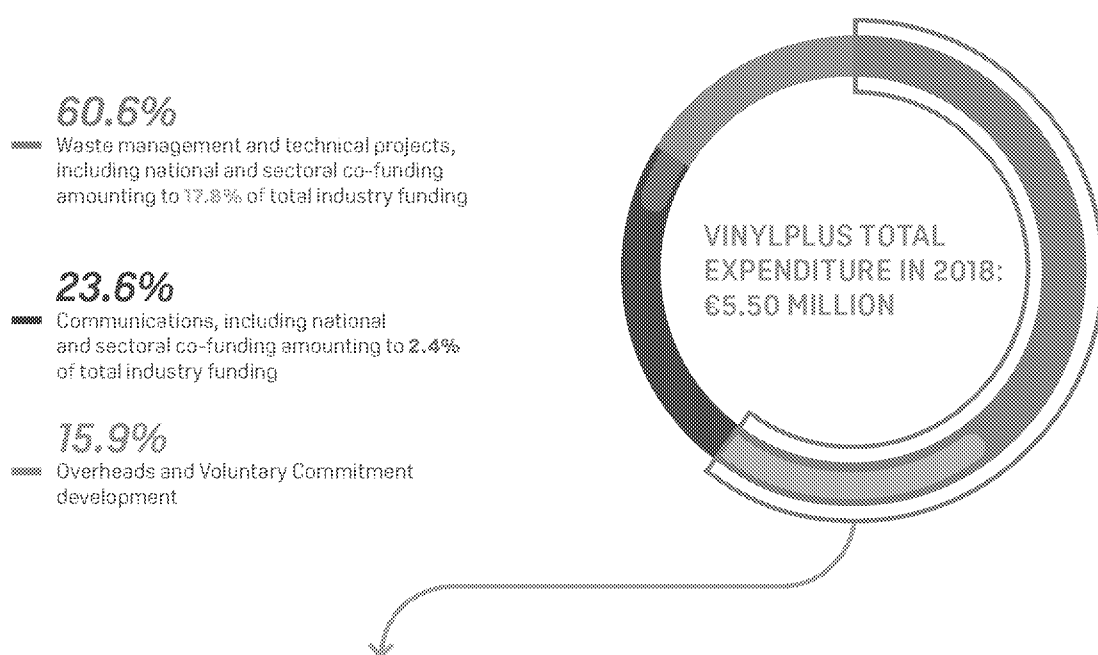
The project aimed to present the VinylPlus® Product Label to relevant stakeholders in Italy. In 2018, informative materials and a special section of the PVC Forum website were developed. Several presentations were made to relevant Italian authorities and institutions, as well as to the PVC value chain (member and non-member companies of PVC Forum). Some presentations were also made at selected industry events (mainly for the window profile sector). The project will continue in 2019 after the accreditation procedure has been completed, with media relations activities and presentations to authorities.

PROJECT LED BY PVC FORUM ITALIA
Geographic scope: Italy

FINANCIAL REPORT

In 2018, industry expense remained stable or slightly decreased. Funding of technical projects decreased by 10%, mainly due to a reduction in the flooring projects and Recovynyl. On the other hand, communications cost increased by 405 KEUR.

Expenditure by VinylPlus, including EuPC and its members, and national and sectoral co-funding, amounted to €5.50 million in 2018.



WASTE MANAGEMENT AND TECHNICAL PROJECTS	TOTAL EXPENDITURE INCLUDING EUPC AND ITS MEMBERS	
FIGURES IN €1,000s	2017	2018
Films and coated fabrics related projects	124	38
Flooring related projects	847	472
EPPA	346	356
ESWA/Roofcollect*	100	88
Recovynyl	1,500	1,300
Studies, start-up & pull concept	338	198
TEPPFA	448	459
Medical applications recycling	60	52
Resysta* consortium	10	2
Oreade chemical recycling	0	365
TOTAL PROJECTS	3,772	3,331



RECYCLED PVC TONNAGES

The table below summarises the tonnages of PVC recycled within the VinylPlus framework in the period 1 January 2018 to 31 December 2018, by initiatives of EuPC sector groups and sectoral associations, and by Recovinyl.

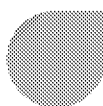
In 2017, the categories rigid films and flexible PVC application have been merged in a category Flexible PVC and films. This category covers rigid and flexible films as well as other flexible applications not elsewhere reported.

The complete Report of Factual Findings regarding the Agreed-Upon Procedures ("AUP") Engagement can be found at page 29.

PROJECT	TYPE OF PVC	TONNAGE RECYCLED IN 2017	TONNAGE RECYCLED IN 2018
Recovinyl (incl. IVK Europe)	Coated fabrics	9,034*	9,573*
Flooring recycling initiative (formerly EPFLOOR)	Flooring	3,051*	2,387*
EPPA (incl. Recovinyl)	Window profiles & related profiles	302,824**	326,276**
TEPPFA (incl. Recovinyl)	Pipes & fittings	80,925**	82,635**
Recovinyl and ESWA – ROOFCOLLECT®	Flexible PVC and films	117,905 which consist of:	167,148 which consist of:
ESWA – ROOFCOLLECT®	Flexible PVC	4,281*	3,531*
Recovinyl (excluding EPFLOOR)	Flexible PVC and films	113,624**	163,617**
Recovinyl	Cables	125,909	151,506
TOTAL		639,648	739,525

* Tonnage including Norway and Switzerland

** Tonnage including Switzerland



VERIFICATION STATEMENTS

KPMG CERTIFICATION OF EXPENDITURE

Independent Accountants' Report on Applying Agreed-Upon Procedures

To the Management of VinylPlus

We have performed the procedures agreed with you and enumerated below with respect to the costs of the supported charges for the different projects of VinylPlus, as included in the VinylPlus Progress Report for the period from January 1, 2018 to December 31, 2018 prepared by the management of VinylPlus.

Scope of Work

Our engagement was carried out in accordance with:

- International Standard on Related Services ('ISRS') 4400 *Engagements to perform Agreed-Upon Procedures regarding Financial Information* as promulgated by the International Federation of Accountants ('IFAC');
- the *Code of Ethics for Professional Accountants* issued by the IFAC. Although ISRS 4400 provides that independence is not a requirement for agreed-upon procedures engagements, you have asked that we also comply with the independence requirements of the *Code of Ethics for Professional Accountants*.

We confirm that we belong to an internationally-recognized supervisory body for statutory auditing.

VinylPlus management is responsible for the overview, analytical accounting and supporting documents.

The scope of these agreed upon procedures has been determined solely by the management of VinylPlus. We are not responsible for the suitability and appropriateness of these procedures.

Because the procedures performed do not constitute either an audit or a review made in accordance with International Standards on Auditing or International Standards on Review Engagements, we do not express any assurance on the cost statement.

Had we performed additional procedures or had we performed an audit or review of the financial statements in accordance with International Standards on Auditing or International Standards on Review Engagements other matters might have come to our attention that would have been reported to you.

Sources of Information

This report sets out information provided to us by the management of VinylPlus in response to specific questions or as obtained and extracted from VinylPlus information and accounting systems.

Procedures and Factual Findings

- a. Obtain the breakdown of costs declared in the table presenting the supported charges for the different projects of VinylPlus, as included in the VinylPlus Progress Report related to the activities of the year 2018 and verify the mathematical accuracy of this.

The total expenses amount to KEUR 5,500.

We found no exceptions as a result of applying this procedure.

- b. Verify that these costs are recorded in the financial statements 2018 of VinylPlus AISBL.

We found no exceptions as a result of applying this procedure.

- c. For project Recovinyt, reconcile costs declared in the table presenting the supported charges for the different projects of VinylPlus with the income recognized in financial statements of Recovinyt AISBL.

We found no exceptions as a result of applying this procedure.

- d. For project not covered by the above procedures, obtain confirmation of costs from legal entity managing or contributing to the project.

We found no exceptions as a result of applying this procedure, which represents 17.57% of total expenses.

Note that financial statements of VinylPlus AISBL, TEPPFA AISBL and Recovinyt AISBL are certified by KPMG.

Use of this Report

This report is intended solely for the information and use of the management of VinylPlus board, and is not intended to be and should not be used by anyone other than these specified parties.

KPMG Réviseurs d'Entreprises SCRL

Statutory Auditor represented by

DOMINIC ROUSSELLE,
Réviseur d'Entreprises

Mont-Saint-Guibert, March 28, 2019

KPMG REPORT OF FACTUAL FINDINGS

REGARDING THE AGREED-UPON PROCEDURES ("AUP") ENGAGEMENT: TONNAGES OF PVC RECYCLED IN THE EU-28 (PLUS NORWAY AND/OR SWITZERLAND) IN 2018, WITHIN THE DIFFERENT PROJECTS OF VINYLPLUS

To the General Manager of VinylPlus AISBL (hereafter "VinylPlus")

We have performed the procedures agreed with you and enumerated below with respect to the tonnages of recycled PVC (within the following projects of VinylPlus) in 2018:

- in the EU-28 by the sector association The European Plastic Pipes and Fittings Association (hereafter "TEPPFA");
- in the EU-28 (plus Norway and Switzerland) within the ROOFCOLLECT system by the members of the sector association European Single ply Waterproofing Association (hereafter "ESWA") and by the sector association European PVC window Profile and related building Products Association (hereafter "EPPA");
- in the EU-28 (plus Norway and Switzerland) by the (members of the) Arbeitsgemeinschaft PVC-Bodenbelag Recycling (hereafter "AgPR") and ReVinylFloor;
- in the EU-28 (plus Norway and Switzerland) within the IVK Europe project; and
- in the EU-28 (plus Switzerland) within the operations of Recovinyl;

as set forth in the accompanying engagement letter dated February 25, 2019. Our engagement was undertaken in accordance with the International Standard on Related Services (ISRS 4400) applicable to Agreed-Upon Procedures Engagements. The procedures were performed solely to assist you in evaluating the tonnages of recycled PVC within the above-mentioned projects of VinylPlus in 2018 and are summarised as follows:

With regard to the MS Excelspreadsheet "KPMG calculation_consoTrecycled_VinylPlus (2018)" for the accounting period January 1, 2018 to December 31, 2018, prepared by management of VinylPlus, regarding the tonnages of recycled PVC (within the above-mentioned projects of VinylPlus) in 2018, we performed the following procedures:

1. Verify, in sheet "VinylPlus 2018" (which contains detailed calculations for the management of VinylPlus), whether the quantities mentioned in the columns H, L, M and N, regarding the quantities of PVC that have been recycled in 2018 by the different projects of VinylPlus, agree with quantities that are mentioned in the:
 - Reports of Factual Findings regarding the Agreed-Upon Procedures ("AUP") Engagements performed by KPMG Réviseurs d'Entreprises SCRL / KPMG Bedrijfsrevisoren CVBA on request of the legal entities listed below, concerning:
 - tonnages of PVC flooring recycled in the EU-28 plus Norway and Switzerland in 2018, by the (members of the) AgPR;
 - tonnages of PVC recycled in the EU-28 plus Switzerland in 2018, within the operations of Recovinyl;
 - Recycling confirmations regarding PVC flooring;

- Extracts of Recovinyl internal audit tracking system on audit status for relevant companies;
- Communication from the concerned projects of VinylPlus; obtained by management of VinylPlus and/or the Senior Project Controller, Mr Geoffroy Tillieux.

2. Verify, in sheet "VinylPlus 2018" the mathematical accuracy of the calculations (to avoid double counting), regarding the quantities recycled PVC in 2018.
3. Verify, in sheet "Table for progress report" (which contains the table for publication in the VinylPlus Progress Report 2019), the mathematical accuracy of the calculations in column F regarding the tonnages recycled in 2018, based on the concerned tonnages mentioned in sheet "VinylPlus 2018".

The table mentioned above is reproduced in the VinylPlus Progress Report 2019, at page 27 with a total recycled tonnage for 2018 of 739,525 tonnes.

We report our findings below:

- with respect to the procedures 1, 2 and 3, we found no exceptions.

Because the above procedures do not constitute either an audit or a review made in accordance with International Standards on Auditing or International Standards on Review Engagements, we do not express any assurance on the tonnages of recycled PVC within the above-mentioned projects of VinylPlus in 2018.

Had we performed additional procedures or had we performed an audit or review of the financial statements in accordance with International Standards on Auditing or International Standards on Review Engagements, other matters might have come to our attention that would have been reported to you.

Our report is solely for the purpose set forth in the first paragraph of this report and for your information and is not be used for any other purpose or be distributed to any other parties, except for publication for informational purposes in the VinylPlus Progress Report 2019. Should any third party wish to rely on the report for any purpose they will do so entirely at their own risk. This report relates only to the tonnages of recycled PVC within the above-mentioned projects of VinylPlus in 2018 and items specified above and does not extend to any financial statements of VinylPlus, taken as a whole.

KPMG Réviseurs d'Entreprises SCRL
Statutory Auditor represented by



DOMINIC ROUSSELLE,
Réviseur d'Entreprises

Mont-Saint-Guibert, March 26, 2019

SGS INDEPENDENT VERIFICATION STATEMENT ABOUT THIS VINYLPLUS PROGRESS REPORT 2019

SGS is the world's leading inspection, verification, testing and certification company. We are recognized as the global benchmark for quality and integrity. With more than 97,000 employees, we operate a network of more than 2,600 offices and laboratories around the world.

SGS was commissioned by VinylPlus to provide an independent verification of the "Progress Report 2019". This report presents the commitments and achievements made by the VinylPlus project in 2018.

The purpose of the verification was to check the statements made in the report. SGS was not involved in the preparation of any part of this report or the collection of information on which it is based. This verification statement represents our independent opinion.

Verification Process

The verification consisted of checking whether the statements in this report give a true and fair representation of VinylPlus' performance and achievements. This included a critical review of the scope of the Progress Report and the balance and the unambiguity of the statements presented.

The verification process included the following activities:

- Desktop review of project-related material and documentation made available by VinylPlus such as plans, agreements, minutes of meetings, presentations, technical reports and more;
- Communication with VinylPlus personnel responsible for collecting data and writing various parts of the report, in order to discuss and substantiate selected statements;
- Communication with some members of the Monitoring Committee.

The verification did not cover the following:

- The underlying data and information on which the desk-top review documentation is based;
- The tonnage of PVC waste recycled (verified by KPMG);
- The chapter Financial Report (verified by KPMG);
- The chapter KPMG Certification of Expenditure;
- The chapter KPMG Certification of Tonnes.

Verification Results

Within the scope of our verification, VinylPlus has provided objective evidence of its performance in relation with its commitments in the VinylPlus programme.

It is our opinion that this "Progress Report 2019" represents VinylPlus' performance in 2018 in a reliable way; this report reflects the effort of VinylPlus to comply with its new Voluntary Commitments of June 2011.

IR PIETER WETERINGS

SGS Belgium NV,
division Certification and Business Enhancement
Certification Manager

25 March 2019





THE NATURAL STEP'S COMMENTARY ON VINYLPLUS PROGRESS REPORT FOR 2018

The Natural Step (TNS) acts as an external advisor, stakeholder intermediary and capacity builder to VinylPlus. The writing of commentary coincides with the 20-year milestone of our work within the chemical industry, and with PVC in particular. With just a few years remaining in the current VinylPlus commitment period it provides a moment for reflection on where the industry has come from, current progress and important reminders in preparing future steps beyond 2020.

What have we learned?

In 1999, at the request of retailers in the United Kingdom under pressure from Greenpeace about their use of PVC, The Natural Step was asked to bring stakeholders to the table to analyse the challenges and opportunities for PVC. Could the material play a role in a sustainable society, and if so, what challenges would need to be solved? The conclusion from the process was that all materials have their strengths and challenges to be sustainably managed and that the PVC industry in Europe would need to tackle a set of key challenges – those now incorporated into the VinylPlus commitment. By using scientific principles, it has been possible to clearly define challenges, set goals to address them and work toward a common vision.

Solid progress, year on year

Despite some stakeholders continuing to have concerns about PVC, VinylPlus is clearly succeeding in providing direction and leadership to address them. We observe a shift in awareness within industry, good recognition and improved perceptions by important stakeholders and solid year on year progress reported against multiple targets. Notable achievements during 2018 include progress on recycling volumes, verified PVC products appearing on the market (VinylPlus® Product Label), outreach and engagement with other parts of the PVC, plastics and chemical industries and work to assess additives in the context of the circular economy, something we have contributed to directly.

New targets on recycling

VinylPlus commitment to plastic industry circularity programmes and announcements of recycling targets beyond 2020 are also welcomed. For the first time these include an absolute percentage of waste targeted for recycling. This is something we view as important in helping stakeholders understand progress. Nevertheless, we have also noted to VinylPlus management that the commitments should be bolder given the learning and investment in a common platform over the years. When demand for recycled rigid PVC is high, as noted in this progress report, this already suggests that there is scope for increasing recycling rates. The real sustainability goal is still controlled-loop PVC management.

Sustainability as a driver of innovation

The role of a voluntary sustainability commitment is to go beyond what is required by law but 'doing more than what's asked' misses the point. The vision, a desire to achieve it and recognition of the necessity and benefits of doing so should energize the change. One topic we have raised with VinylPlus is working to ensure all parts of the industry are really using sustainability to drive innovation. The progress report gives an overall picture of activities at industry level but how well do

individual companies internalize knowledge about sustainable PVC management when making decisions about product development, for example? We would like to hear more about that and believe that VinylPlus could investigate this more. For example, through evaluating the company-level impact of the product label, benchmarking company practices, outcomes from the assessment of additives etc.

How much progress is enough?

The pace of change in industry and society is far too slow given what we know about sustainability. This needs to be remembered when discussing the progress being made year on year. The reality is that business models are still largely based on the linear economy, the majority of PVC waste is still not being recycled, regulators and industry continue to struggle with how to manage legacy additives and the climate is changing faster than even leading scientists expected. We therefore encourage VinylPlus to make all efforts to increase the sense of urgency in tackling the key challenges for PVC. We will keep reinforcing that 2020 is not the finish line, but a milestone on the longer sustainability journey.

Changing context and the global situation for PVC

The circular economy, Paris Accord and the UN Sustainable Development Goals are further evidence that the context for VinylPlus is changing. Pressure to act will continue to mount. Ultimate success must be to future-proof the industry at a rate that meets stakeholder expectations, demonstrating where and how PVC serves societal needs better than alternatives. Therefore, we recommend that VinylPlus begin the process of consulting stakeholders on where the industry needs to go next, including how to address bottlenecks and speed up progress. With PVC production now mostly in Asia, it will be important that progress in Europe is also expanded. Global standards are clearly needed if different levels of PVC sustainability performance are to be recognized. This should be an important priority for industry and policy-makers in Europe from a competitiveness perspective, and it is critical for overall progress toward sustainability.

RICHARD BLUME

TNS Project Leader & Senior Advisor

OUTI UGAS

Former Chair of The Natural Step International

Stockholm, February 2019

APPENDIX

CHALLENGES

1

CONTROLLED-LOOP MANAGEMENT:

"We will work towards the more efficient use and control of PVC throughout its life cycle."

TARGETS

1. Recycle 800,000 tonnes/year of PVC by 2020.
> **ongoing**

2

ORGANOCHLORINE EMISSIONS:

"We will help to ensure that persistent organic compounds do not accumulate in nature and that other emissions are reduced."

TARGETS

1. Engage with external stakeholders in the discussion on organochlorine emissions during 2012.
> **achieved**

3

SUSTAINABLE USE OF ADDITIVES:

"We will review the use of PVC additives and move towards more sustainable additive systems."

TARGETS

1. Lead (Pb) replacement in the EU-27 by end 2015 (extended to the EU-28 in 2014).
> **achieved**

4

SUSTAINABLE USE OF ENERGY AND RAW MATERIALS:

"We will help to minimise climate impacts through reducing energy and raw material use, potentially endeavouring to switch to renewable sources and promoting sustainable innovation."

TARGETS

1. Establish Energy Efficiency Task Force by end 2011. > **achieved**
2. PVC resin producers to reduce their specific energy consumption, targeting 20% by 2020. > **ongoing**

5

SUSTAINABILITY AWARENESS:

"We will continue to build sustainability awareness across the value chain – including stakeholders inside and outside the industry – to accelerate resolving our sustainability challenges."

TARGETS

1. VinylPlus web portal to go online in summer 2011.
> **achieved**
2. VinylPlus Monitoring Committee, which will meet a minimum of twice a year, will be established by end 2011.
> **achieved + ongoing**
3. A VinylPlus Membership Certificate will be launched end 2011.
> **achieved**

50: Even though this target has had to be withdrawn (see p. 12 of VinylPlus Progress Report 2017), VinylPlus will continue to pursue efforts to find technically and economically viable solutions for difficult-to-recycle PVC waste

60: Converters are striving to increase their energy efficiency. However, due to the complexity and variety of operations in the converting sectors, an overall target would be meaningless, as would targets for many of the subsectors

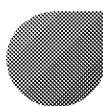
61: Even though this target was not achieved in 2013, VinylPlus continued to work on increasing the number of programme participants. It will continue to do so in the future too

VINYLPUS VOLUNTARY COMMITMENT TARGETS

<p>2. Exact definitions and reporting concept to be available by end 2011. > achieved</p>	<p>3. Develop and exploit innovative technology to recycle 100,000 tonnes/year of difficult-to-recycle PVC material (within the overall 800,000 tonnes/year recycling target) by 2020. > withdrawn⁶⁹</p>	<p>4. Address the issue of 'legacy additives' and deliver a status report within each annual VinylPlus Progress Report. > ongoing</p>	
<p>2. Develop a plan to deal with stakeholder concerns on organochlorine emissions by end 2012. > achieved</p>	<p>3. Compliance with the PVC resin industry Charters by first Quarter 2012. > partially achieved 3.a. Achieve full compliance by 2020.</p>	<p>4. Risk assessment for the transportation of major raw materials, in particular VCM, by end 2013. > achieved in 2015</p>	<p>5. Target zero-accident rate with VCM release during transportation in the next 10 years. > ongoing</p>
<p>2. Robust criteria for the 'sustainable use of additives' to be developed, with status report by end 2012. > achieved in 2014</p>	<p>3. Validation of the robust criteria for the 'sustainable use of additives' in conjunction with the downstream value chain, with status report by end 2014. > partially achieved 3.a. Develop a methodology for the sustainable choice of additives for profiles. > achieved 3.b. Develop a methodology for the sustainable choice of additives for flexible applications. > ongoing 3.c. Develop a systematic framework methodology, taking into account the EU PEF concept. > achieved</p>	<p>4. Other PVC additive producers and the downstream value chain will be invited to participate in the 'sustainable additives' initiative. > ongoing</p>	
<p>3. Define targets for specific energy reduction for converters by end 2012. > partially achieved⁶⁰ 3.a. PVC converters will report their gains in energy efficiency year on year. > ongoing</p>	<p>4. Energy Efficiency Task Force to recommend suitable environmental footprint measurement by end 2014. > delayed (waiting for the EU PEF pilot phase results)</p>	<p>5. Establish Renewable Materials Task Force by end first Quarter 2012. > achieved</p>	<p>6. Renewable Materials Task Force's status report by end 2012. > achieved + extended 6.a. Updated status report by the end of 2020.</p>
<p>4. A public, and independently audited, VinylPlus Progress Report will be published annually and proactively promoted to key stakeholders. With the first edition being published in 2012. > achieved + ongoing</p> <p>5. Annual external stakeholder meetings will be organised, commencing in 2012. > achieved + ongoing</p>	<p>6. A VinylPlus product label will be launched by end 2012. > launch achieved in 2014; implementation ongoing</p> <p>7. ECVM will take an active role in promoting VinylPlus within international PVC industry organisations worldwide. > ongoing</p>	<p>8. ESPA stabiliser producers will actively promote VinylPlus outside the EU-28. > ongoing</p> <p>9. VinylPlus will increase the number of programme participants by 20% compared to 2010 by end 2013. > not achieved⁶¹</p> <p>10. VinylPlus will engage with five global brand holders by end 2013. > partially achieved + ongoing</p>	<p>11. A review of progress towards the globalisation of the approach will be undertaken by end 2015. > achieved</p> <p>12. A Social dialogue commitment endorsed by the EU Sectoral Social Dialogue Committee for the Chemical Industry will be included in the VinylPlus programme by the end of 2016. > achieved + ongoing</p>

GLOSSARY

ADCA	Azodicarbonamide	IVK EUROPE	Industrieverband Kunststoffbahnen e.V. (Plastic Sheets and Films Association – www.ivk-europe.com)
AGPU	Arbeitsgemeinschaft PVC und Umwelt e.V. – the German association of the PVC value chain (www.agpu.com)	KPMG	KPMG is a global network of professional firms providing audit, tax and advisory services (www.kpmg.com)
ASF	Additives Sustainability Footprint	LCA	Life Cycle Assessment
BSP	Butyl benzyl phthalate	LMW PHTHALATES	Low Molecular Weight phthalates
BSC	Building and construction	NaCl	Sodium Chloride
BPF VINYLPLUS UK	The PVC value chain's Members Group of the British Plastics Federation (www.bpf.co.uk)	Pb	Lead
BTHC	Butyryl tri-n-hexyl citrate	PE	Polyethylene
Ca	Calcium	PEF	Product Environmental Footprint
CLP	European Regulation on Classification, Labelling and Packaging of chemical substances and mixtures. The legislation introduced throughout the EU a new system for classifying and labelling chemicals, based on the United Nations' Globally Harmonised System (UN GHS)	PLASTICISERSPLUS	European Plasticisers' legal entity, based in Brussels, Belgium
DBP	Di-n-butyl phthalate	ppm	Part per million (also equivalent to 1 mg per kg)
DEHA	Di(2-ethylhexyl) adipate	PRE	Plastics Recyclers Europe (www.plasticsrecyclers.eu)
DEHP	Di(2-ethylhexyl) phthalate	PVC	Polyvinyl chloride
DEHT	Di(2-ethylhexyl) terephthalate	PVC FORUM ITALIA	The Italian association of the PVC value chain (www.pvcforum.it)
DEHTP	Di-octyl terephthalate	P-PVC	Plasticised PVC
DIBP	Di-isobutyl phthalate	RAC	Committee for Risk Assessment
DINA	Di-isononyl adipate	REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals
DINCH	Di-isononyl cyclohexane dicarboxylate	REWINDO	the German recycling initiative for PVC windows, roller shutter and related product (www.rewindo.de)
DINP	Di-isononyl phthalate	RoHS	EU legislation restricting the use of hazardous substances in electrical and electronic equipment (RoHS Directive 2002/95/EC)
DOTP	Di-octyl terephthalate	RoHS 2	The recast RoHS Directive 2011/65/EU (RoHS 2) entered into force on 21 July 2011
DPHP	Di(2-propyl heptyl) phthalate	R-PVC	Recycled PVC
EC	European Commission	SDGs	Sustainable Development Goals
ECHA	European Chemicals Agency (http://echa.europa.eu)	SDS	Safety Data Sheet
ECVM	The European Council of Vinyl Manufacturers (www.pvc.org)	SDS-R	Safety Data Sheet for Recyclates
ECVM 2010	The ECVM's formal legal entity, registered in Belgium	SEAC	Committee for Socio-Economic Analysis
EDC	Ethylene dichloride or 1,2-dichloroethane	SGS	Société Générale de Surveillance, the world's leading testing and verification organisation (www.sgs.com)
EPA	Environmental Protection Agency	S-PVC	Suspension polyvinyl chloride
EPD	Environmental Product Declaration	SSDC	Sectoral Social Dialogue Committee
EPPA	European PVC Window Profile and Related Building Products Association (www.eppa-profiles.eu)	SVHC	Substances of Very High Concern
EPS	Expanded polystyrene	TEHTM	Tris(2-ethylhexyl) trimellitate
E-PVC	Emulsion polyvinyl chloride	TEPPFA	The European Plastic Pipes and Fittings Association (www.teppfa.eu)
ERPA	European Rigid PVC Film Association, an EuPC sectoral association (www.pvc-films.org)	THE NATURAL STEP	A sustainability NGO acting as critical friend and sustainability advisor to VinylPlus (www.thenaturalstep.org)
ESPA	The European Stabiliser Producers Association (www.stabilisers.eu)	TOTM	Tris(2-ethylhexyl) trimellitate
ESWA	European Single Ply Waterproofing Association, an EuPC sectoral association (www.eswa.be)	UN	United Nations
EuPC	European Plastics Converters (www.plasticsconverters.eu)	UNFCCC	United Nations Framework Convention on Climate Change
EUROPEAN PLASTICISERS	Former ECPI (www.europeanplasticisers.eu)	UNIDO	United Nations Industrial Development Organization
GHS	Globally Harmonised System of Classification and Labelling of Chemicals	U-PVC	Unplasticised PVC
HCl	Hydrogen Chloride	VCM	Vinyl chloride monomer
HMW PHTHALATES	High Molecular Weight phthalates	VINYL 2010	The first 10-year Voluntary Commitment of the European PVC industry, signed in 2000
HSE	Health, Safety and Environment	VFSE	Vinyl Films & Sheets Europe (www.vfse.org)
INDUSTRY CHARTERS	ECVM Industry Charters for the Production of VCM and S-PVC (1995) and for the Production of E-PVC (1998)	WUPPI	Danish company set up to collect and recycle rigid PVC (www.wuppi.dk)



THE EUROPEAN PVC INDUSTRY

Polyvinyl chloride, or PVC, is one of the most widely used polymers in the world. Because it is so versatile, PVC is used extensively in a broad range of industrial, technical and everyday applications.

PVC is an intrinsically low-carbon plastic: 57% of its molecular weight is accounted for by chlorine derived from common salt, 5% by hydrogen and 38% by carbon. It is recyclable and is increasingly being recycled. The European PVC industry has been working hard to boost collection and improve recycling technologies.

Several recent eco-efficiency and LCA studies of major PVC applications have shown that in terms of energy use and GWP (global warming potential), the performance of PVC is comparable to that of alternative products. In many cases, PVC applications resulted in both lower total energy consumption and lower CO₂ emissions.

Due to its light weight, durability and stability, PVC can offer energy, cost and material efficiency gains for sectors such as building and construction, water distribution, health and transportation.

At the European level, the PVC value chain is represented by four associations:



THE EUROPEAN COUNCIL OF VINYL MANUFACTURERS,

representing six leading European producers of PVC resin, which account for around 75% of EU-28 PVC resin production. These businesses operate around 40 different plants spread over 23 sites and employ approximately 7,000 people.

www.pvc.org



EUROPEAN PLASTICS CONVERTERS,

an association representing more than 50,000 companies in Europe, which produce over 50 million tonnes of plastic products every year both from virgin and recycled polymers. They employ more than 1.6 million people, generating turnover in excess of €260 billion per year.

www.plasticsconverters.eu



THE EUROPEAN STABILISER PRODUCERS ASSOCIATION,

representing 10 companies that produce more than 95% of the stabilisers sold in Europe. They provide direct employment to more than 2,000 people in the EU.

www.stabilisers.eu



EUROPEAN PLASTICISERS,

formerly ECPI, representing the eight major European producers of plasticisers, which produce around 90% of the plasticisers manufactured in Europe. They employ approximately 1,200 people in plasticiser production.

www.europeanplasticisers.eu



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Promoting Sustainability in Sports

Combining youth, sports, education and gender equality, She Runs – Active Girls' Lead 2019 was the perfect event for VinylPlus to partner with and promote sustainability in the sport community.

She Runs – Active Girls' Lead is the international racing event organised by the International School Sport Federation (ISF), supported in 2019 by the EU Erasmus+ Programme and the City of Paris. It aims to promote girls' health, emancipation, and leadership through school sport.

PVC plays an integral role in sports, thanks to its unique functional properties. It is widely used in stadiums, from floorings to roofing and exterior screenings, as well as in countless sports equipment.

The PVC products and equipment used for the She Runs event, from tents to banners, flooring, furniture, yoga mats and sport balls, were provided by VinylPlus partners and re-used or recycled after the event.